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CLEAN AIR ACT: NEW SOURCE REVIEW REGULATORY PROGRAM

HEARING

BEFORE THE

SUBCOMMITTEE ON
CLEAN AIR, WETLANDS, PRIVATE PROPERTY AND NUCLEAR SAFETY

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

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C O N T E N T S

CLEAN AIR ACT: NEW SOURCE REVIEW REGULATORY PROGRAM

MONDAY, FEBRUARY 28, 2000

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON CLEAN AIR, WETLANDS, PRIVATE PROPERTY,
AND NUCLEAR SAFETY,
Cincinnati, Ohio.

The subcommittee met, pursuant to notice, at 2:30 p.m. at the Hamilton County Administration Building, 138 East Court Street, 6th Floor, Cincinnati, Ohio, Hon. James M. Inhofe (chairman of the subcommittee) presiding.

Present: Senators Inhofe and Voinovich.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. The meeting will come to order. I apologize, but it seems like we had our news conference before instead of after the meeting, which is fine with me.

Today's hearing is on the reform of the New Source Review Regulatory Program. This is a highly complicated issue and hopefully we can shed some light on it today. This hearing is not about recent enforcement actions taken by the EPA against the electric utilities, although those actions were filed using the existing regulations.

For those people in the audience who are not familiar with the way the EPA works, let me explain. The Air Program Office writes the regulations and the Enforcement Office polices the compliance of those regulations that have been written.

What I would like to do now is briefly layout where we are today and invite some of the witnesses to comment. The New Source Review Program dates back to the Clean Air Act of 1977. The Act required sources built after 1977 to have state-of-the-art emissions control devices. Congress did not believe this was fair and equitable and financially feasible to require all existing facilities to install new equipment.

Instead, Congress required existing large facilities to undergo a New Source Review before they make major expansions or modifications in order to prevent significant new air emissions. These facilities have been referred to as grandfathered facilities, meaning that they are originally exempted from the new provision controls.

Although, of course, they have had to install other control devices over the years.

This program started a confusion and debate, which has lasted for almost 25 years now. I am told that over the years the EPA has issued more than 4,000 pages of guidance documents, which sometimes contradict each other, in order to explain the original 20-page, 1980 regulations.

In the late 1980's the Wisconsin Electric Power Company, called WEPCO, challenged a determination by the EPA that they had violated the NSR regulations. The lawsuit resulted in a new regulation governing the NSR for utilities in 1992 called the WEPCO rule. Then in 1994 the EPA issued a new proposed rule for all industries and after 6 years in debate the EPA has indicated that they may go final with their new rule later this year.

In my opinion, the major question is: when do modifications or changes to a facility or plant trigger the New Source Review Program. This involves a number of issues, such as whether you measure actual releases or just potential to release; whether you look at the dollar amount of the modifications and compare it with the value of the facility; or whether the modifications are just routine maintenance which is also hard to define. Considering the amount of debate over the last 25 years, the number of guidance documents and regulations issued by the EPA, and the number of lawsuits, I don't expect that we're going to be able to answer all the questions that exist today.

I would like to publicly thank Bob Perciasepe, EPA's Clean Air Director, for working these issues out. He couldn't be here with us today. He sent a very capable person to represent him.

Senator Voinovich?

OPENING STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Senator VOINOVICH. Thank you, Mr. Chairman. First of all, I would like to thank the county commissioners, John Dowling, Tom Neyer, and Bob Bedinghaus, for allowing us to use this fine facility here in Cincinnati; and I would like to welcome you here, Mr. Chairman. The chairman and I have known each other since his days when he was the Mayor of the City of Tulsa, Oklahoma, and I was the Mayor of the City of Cleveland and we've worked together in the Senate; and I consider him a true champion of responsible environmental policy.

I don't know whether you know this or not, Mr. Chairman, but this is the home of Ken Griffey, Jr., and he's coming home to play and join his dad on the Reds team, and we're expecting some great things from him.

Senator INHOFE. Sure, yes. Is that an invitation to come up and——

Senator VOINOVICH. Come up for the I–71 World Series.

Cincinnati is our queen city and it has a wonderful public partnership and a community that really cares about the environment and public health.

I'd also like to welcome Congressman Ted Strickland. Ted is testifying today, and Ted and I have worked together in a bipartisan manner on a range of issues including the post ambient air stand-

ards for a particulate ozone; proposed NAAQS standards. Right now we're working on the Portsmouth gas infusion plant to try and predict in the interest of the workers, and I'm glad you're here today, Ted.

I'd also like to extend a warm welcome to Bill Tyndall, Vice President of Environmental Services and Federal Affairs at Cinergy Corporation in Cincinnati. Cinergy is a responsible corporate citizen in the environmental arena and I am pleased that Mr. Tyndall is here today and he's testified before our committee before, Mr. Chairman.

As I said, Southwest Ohio cares a great deal about clean air and the environment. I think it's appropriate that Cincinnati was chosen as the location for this hearing today. Just last month the U.S. EPA issued a proposed rule to redesignate Cincinnati as in attainment of the 1-hour ozone rule. I want to congratulate the greater Cincinnati community for working on that through a variety of coordinated programs to improve the quality of Ohio's air. And we're very hopeful that Administrator Browner will quickly act to finalize the rule following the close of the public comment period.

Incidentally, Mr. Chairman, when I first entered office in 1991 as Governor of the State of Ohio, most of Ohio's urban areas were not attaining the 1-hour ozone standard. By the time I left in 1998 all but Cincinnati were in attainment. So we're very, very proud of the fact that we've achieved that standard. And as you know, I have been very concerned about the new proposed standards for ambient air particulate matter and part of the reason is because we worked so doggoned hard to reach the 1-hour ozone standard. And as many people in this room know, I testified in your committee. The chairman helped us with that, and finally had to go to court over those regulations. A U.S. Appeals Court several weeks ago remanded EPA's ozone and $PM_{2.5}$ standards ruling that the EPA did not justify its decision with sound scientific evidence. So that we want a clean environment, but we want reasonable rules.

Now, we're here today to talk about the New Source Review Program and the proposed changes to the program. I think the chairman has done a good job explaining the history of it.

We have a clean air statute. While I have some concerns about the law, it has done a great deal to clean up the nation's air and has improved public health and the environment. We need clear guidelines on how EPA will enforce provisions of that law and we need clear rules for industry to play by.

I think you are going to be having a series of hearings, Mr. Chairman? Perhaps next year, we'll look at reauthorizing the Clean Air Act?

Senator INHOFE. Yes. We have two more this year. We've already had one. Then we'll start the process, and we set a rather ambitious schedule for completing it.

Senator VOINOVICH. I think it's important to look into the problems created by the New Source Review Program and look for the solutions needed to clarify the rules, and I commend U.S. EPA for taking on that task. Whether we're talking about the electrical utility, pulp and paper, or refining industries, one thing is clear: it is important for them to know the rules of the game. It should be clear to them what kinds of repairs can be made before triggering

New Source Review, because repairs need to be made in a timely manner to insure worker safety and reliability of service, particularly electricity. So I urge the EPA to take into consideration the unintended consequences that are associated with this issue. We need to insure that this rule will help maintain air quality standards, but we also need to insure that needed maintenance repairs can be made so as not to jeopardize worker safety or the reliability of needed services.

I also want to raise concern about the length of time it takes to receive a New Source Review permit, either to build a new facility or to make changes in an existing facility. I've been told that the standard timeframe is between one and 2 years. I also understand that even getting a determination on whether a New Source Review permit is needed is also a timely process. I'm not sure that most industries can withstand that kind of timeframe without suffering serious consequences. A plant operator needs to make a decision much earlier than that to insure worker safety and, particularly, reliability of service.

In addition, competitiveness is called into question. For instance, if a computer chip manufacturer wants to build a new plant it is likely that the technology will have changed during the time it takes to get an NSR permit and build the facility. I just think there needs to be some balance here.

So, again, I commend the agency for moving forward to reform the program and I hope that it will keep those issues in mind as it proceeds forward. I am pleased that the EPA has worked with various stakeholders during the rulemaking process, and I strongly encourage them to do the same with the electric utilities. You learn more through communication, and that's what I hope will be achieved today through this hearing and will be achieved as the EPA continues the stakeholder discussions.

Mr. Chairman, I ask that my statement be made a part of the record.

Senator INHOFE. Without objection.

Thank you, Senator Voinovich. I sometimes find that people in the local community are not as aware as they are in Washington in certain areas of expertise as the people who represent them. I was very pleased to have had one of the toughest jobs in the world, that is to be the mayor of a major city, when we were mayors together. And way back at that time and up to the present, Senator Voinovich has been one of those individuals who has been an expert in the field of clean air. And as he mentioned, he actually came as Governor of Ohio and testified before the committee that I chaired, the committee that we're in right now.

I'm very happy to have Ted Strickland here, who I served with in the House. And while you're coming up, Congressman Strickland, let me just kind of give you an overview of what we're going do today. We've got a lot of people here. We've got four panels and then one panel has several on it. So with all seven witnesses we're going to have to keep moving along.

I also mentioned that some of the Senators who are not here today, their staff is here; and they're going to be taking information back to their Senators in Washington but some of them could not be here today.

Each witness will be allocated 5 minutes to give his opening statement. They'll be lights. And I see Andrew Wheeler brought his lights from Washington here. It's red and yellow and green. I think we all know what that means. So with that we will go ahead and begin.

And, Congressman Strickland, it's a pleasure having you here with us today in your district.

STATEMENT OF HON. TED STRICKLAND, U.S. REPRESENTATIVE FROM THE STATE OF OHIO

Representative STRICKLAND. Thank you. Thank you, Mr. Chairman. Thank you for your coming to Ohio. And Senator Voinovich, I especially want to thank you for the fact that you have shown leadership in supporting one of Ohio's great resources, and that is the use of and continued use of coal. That's certainly very important to my district.

I do represent the Sixth District. It's a 14-county, sprawling district, from Warren County in the west to Washington County in the east. This part of the State offers beautiful natural forest land, some of the most pristine farmland in Ohio, and many unique historic sites.

Briefly, I just would like to share this morning some troubling statistics from my district and my concerns about EPA's New Source Review Program. I think together this information demonstrates the need for meaningful reform of the NSR program so that we can strike a better balance between the pace of desired environmental benefits and the increased productivity anticipated through economic development initiatives.

As Senator Voinovich knows, the Sixth Congressional District is one of the poorest in Ohio and even the country. It has the lowest per capita income and the highest poverty rate of any district in Ohio. Unfortunately, southern Ohioans have not experienced the full economic recovery that most of the U.S. has enjoyed. The Sixth District includes Meigs and Vinton Counties, which have among the highest unemployment rates of any of Ohio's 88 counties, 11.1 percent and 13.8 percent, respectively, compared to a statewide average of 4.3 percent. These statistics clearly underscore the region's enthusiasm for economic development opportunities and its fear of regulations which may hamper job creation. Without a doubt, low cost energy and high quality manufacturing labor are vital to the economic prospects of the region.

A substantial number of the labor force, more than 25 percent, is employed in the manufacturing sector. And this region provides a significant number of jobs in the utility, mining, and refining sectors. Southern Ohio cannot withstand the loss of these jobs and it certainly cannot afford to overlook any opportunity for job creation. I have heard from the International Brotherhood of Electrical Workers, who raised specific issues about EPA's New Source Review proposed rule, and it should come as no surprise that one such concern is job loss. Under the current NSR program, decisions could be made to shut down utilities rather than venture into the confusing NSR permitting program to undertake what could be considered routine maintenance activities. Obviously this would result in layoffs.

As you know, the New Source Review was first introduced as part of the 1977 Clean Air Amendment. The program was designed to insure that newly constructed facilities and substantial modifications of existing facilities do not result in the violation of applicable air quality standards. The New Source Review Program is acknowledged to be a very complicated program and a potential bottleneck to many positive community development projects, including brownfields redevelopment and the manufacturing facility improvements and modernization.

For example, the specific requirements dictated by the New Source Review Program depend on the location of the facility. If a plant is cited in a part of the country that fails to meet the national ambient air quality standards for a pollutant, one set of requirements apply. If a plant is in a max attainment area, another set of rules apply. As you can imagine, some facilities may rest in a region that is considered in attainment for some criteria pollutants but not others, complicating the requirements even further.

Let me quickly describe some frustrations my constituents and others have shared with me concerning this program. I've learned that merely determining whether the program applies to a project depends on complicated rules and guidelines which have been subject to 20 years of EPA's interpretation. I've also been told that EPA could require a preconstruction permit under NSR for the replacement of worn equipment parts even though the replacements are only modifications and not new construction.

I know the EPA claims many successes under the NSR program, and I applaud the reduction or prevention of pollutant emissions. The environmental protections afforded under the NSR program should not be minimized here today; however, the EPA's most recent proposed changes to the NSR lead to considerable controversy and the agency acknowledges the need to build a more flexible program and streamline the permitting process. I would suggest that a truly meaningful reform of the NSR program can actually lead to even greater environmental benefits in the future.

And in closing, let me say that this past fall I raised the concern that the EPA should not short-change the discussion on meaningful NSR reform. I am pleased to hear that a full review of approaches to NSR reform is ongoing. Without sufficient dialog among the interested parties, I have little confidence that a workable solution can be reached.

Therefore, I would like to state very clearly that congressional oversight of this process does not stop here in Cincinnati. Indeed I think today's hearing demonstrates that both senators and representatives will continue to monitor the progress made to reform this program. With hard work and cooperation I believe an equitable proposal can be crafted that creates an efficient NSR rule without unnecessary pitfalls and establishes a proper balance between environmental benefits and economic progress.

Mr. Chairman, in closing let me thank you once again for holding this hearing and Senator Voinovich for bringing it to Ohio. Thank you very much.

Senator INHOFE. Thank you, Congressman Strickland. I hope it's obvious to everyone that this is not a partisan thing. We are all concerned. First of all, Democrats and Republicans alike want

clean air. Democrats and Republicans also want fair treatment. During the course of our little news conference out here I told them the major concern I had is the unpredictability. People don't know, and that's what we're here to find out today, if they know what they can properly plan for in advance, how much time it's going to take to comply.

I guess you would agree, Congressman Strickland, that both Democrats and Republicans feel that the dialog between the EPA and the stakeholders should continue?

Representative STRICKLAND. I think it's essential. And I think, as I said near the close of my statement, that it's incumbent upon those of us who are in the House and those of you who are in the Senate to make sure that this process proceeds in a manner that involves meaningful dialog and input from all stakeholders.

Senator INHOFE. I'm sure this will be a surprise to you when I say it, but we have witnesses today who are testifying that the EPA has issued conflicting guidance on this program over the last 20 years or so. I know my constituents are concerned with that back in Oklahoma, and you have some that are concerned with that here.

Representative STRICKLAND. Well, they absolutely are, and it's important for a Federal agency to proceed in a fair manner. And I am troubled by some of the actions which seem to reach back to apply rules or interpretation of rules retroactively. That troubles me greatly. I see no fairness to that, and I think it's our responsibility as elected officials to make sure that what happens is done in a fair and a justifiable manner, and that's why I'm here today.

Senator INHOFE. Because of the time constraints and the number of witnesses, we had to restrict the opening statements. You were talking about the frustrations of your constituents. Did you get a chance to complete that thought?

Representative STRICKLAND. Well, I did not but I'll submit it for the record. So many of my constituents representing both working folks, members of the work force, as well as the management of some of these facilities, are terribly concerned and justifiably so. And that's why I am so pleased that you're holding this hearing.

Senator INHOFE. I think that's one of the issues here, Representative Strickland, that we have. Both labor and management are the big losers if we become noncompetitive. And I know—I can't speak for Ohio, but I can in Oklahoma. We've had some businesses actually have to leave and go across the border. And, of course, we're a little closer to Mexico, and we've lost a ton of jobs in Oklahoma as a result of this. And I assume that you have some examples here in Ohio, also.

Representative STRICKLAND. Well, I think there is great fear, as Senator Voinovich said a little earlier, the concern about the lack of predictability and not knowing what interpretations are going to be made regarding which regulations and how they are going to be applied. It seems to be one of the most troublesome aspects of this situation.

Senator INHOFE. Senator Voinovich?

Senator VOINOVICH. I'm interested in reading the letter from the—was it the president of the IBEW?

Representative STRICKLAND. Yes.

Senator VOINOVICH. Are you aware of the fact of whether or not that organization is participating at all in the negotiations that are going on in terms of the rulemaking?

Representative STRICKLAND. I am not aware as to whether or not that particular organization is, but it's a good question. I certainly will talk with him. It seems important to me, Senator, that all stakeholders be given a voice in this process and be listened to. And that's the only way I think we can come to a consensus that is going to be widely embraced by all parties.

Senator VOINOVICH. Well, I'm a big believer in quality management. I think so often when we talk about these things that we don't really bring in the people that are actually doing the work and have the insight into what some of this means. So often you get an engineer from some company that says, well, this is the way it is, and the other person on the other side says what he has to say. And if you had somebody that was really doing the work at the table with them, they'd have a much better understanding of what it's about. And I would hope that representatives here from the EPA make sure that some of those people are involved who are actually out there getting the job done in terms of——

Representative STRICKLAND. Absolutely. If I can just say as a concluding statement here, my district is a unique district but it is also a district not unlike other districts across the country in terms of its economic needs and in terms of its past history of having heavy manufacturing jobs and so on. And it is really troubling to me that a district like mine, and districts like mine across this country, could find themselves in an ever more difficult set of economic circumstances at a time when they really need to be able to make economic progress and to attract industry and create jobs and so on.

And quite frankly, in perhaps a selfish way, that is the primary motivation behind my speaking out on this issue, and I think it's very important. It's important to my constituents and to the industries which serve my constituents. Thank you very much.

Senator INHOFE. Well, let me just—I think what Senator Voinovich is suggesting is something that is a very good idea, to bring them in, the labor force in. They have just as much to be concerned with as anybody else. So I would like to ask you specifically to encourage them to do that, maybe today, to make some calls and get an involvement.

I would also like to say that Senator Voinovich mentioned the ambient air proposed rules that we went through for about 2 years. And we held a field hearing out in Oklahoma. We had your Lieutenant Governor and several people from Ohio out there, and it seems like Oklahoma and Ohio have a lot of things in common in terms of regulations. So it's nice to have you here to testify. Thank you very much.

Representative STRICKLAND. Thank you, Senator.

Senator INHOFE. Now, I'd like to ask our second panel, Mr. John Seitz, Director of Office of Air Quality Planning and Standards. Mr. Seitz is a regular here and we always are able to get a lot of healthy compromises and communications, and I appreciate very much your coming today.

Mr. SEITZ. Thank you, Senator.

STATEMENT OF JOHN S. SEITZ, DIRECTOR, OFFICE OF AIR QUALITY PLANNING AND STANDARDS, ENVIRONMENTAL PROTECTION AGENCY

Mr. SEITZ. Good afternoon, Mr. Chairman and Senator Voinovich. I thank you for the opportunity to be here today on behalf of the administration to talk to you about the New Source Review Program.

Enacted in Congress in 1977, the program's goal was to minimize air pollution from large, newly built, and modified industrial facilities. Recent figures suggest that over the life of the program NSR has prevented move than 100 million tons of pollution from getting into the air. The NSR program insures that when companies upgrade their facilities in a way that increases air pollution that they also take specific measures to minimize those increases. Upgrading pollution controls in the industrial infrastructure simultaneously make good economic and environmental sense. It's a simple concept that has been working in the NSR program for almost a quarter century, protecting our nation's air resources and makeing a critical part of the air quality program.

The NSR provisions of the Clean Air Act combine air quality planning, air pollution technology requirements, and stakeholder participation. The only time NSR applies is when a facility makes a change that could significantly increase air pollution. This means a facility can make any change it wants so long as emissions could not increase. If a facility is unsure whether a change will trigger NSR review, there are many resources available to help them answer that question, most notably the State and local agencies. States are key partners in this program. Under the Act generally the States have the primary responsibility for issuing permits and they can customize their NSR program within the bounds of the EPA regulations.

The NSR permit program for major sources has two different components: one for areas where the air is dirty or unhealthy, and the other for areas where the air is cleaner. In areas with unhealthy air, NSR assures that the sources do not impede progress toward cleaner air. In areas with clean air, especially pristine areas like national parks and wilderness areas, the program assures that emissions from new and modified sources do not significantly degrade the air quality. The program assures citizens that if any large industrial source being built or modified in their neighborhood, then the pollution aspects are addressed.

Permits for sources located in attainment areas are known as prevention or significant deterioration—or PSD—permits. Permits for sources located in areas not meeting the National Ambient Air Quality Program are known as NSR permits. A major difference in the two programs is that the control technology requirement is more stringent in the nonattainment areas.

Let me give you a few statistics about the NSR program. Our most recent data indicate that approximately 1 percent of large facilities or roughly about 250 facilities of 20,000 industrial facilities in this country are going through the NSR program annually. Recent data also show that these permits have prevented about a half a million tons per year of pollution from entering the environment. It's remarkable that annually less than 1 percent of these large

sources are involved in the program, yet so much pollution is averted. These emission reductions are being achieved at the same time as the unprecedented economic expansion. We believe the program is achieving its goal.

In addition to the emission reductions, the NSR program has sparked improvement in pollution control and pollution prevention technology. This technology forcing aspect of the program is an important reason why it has been so successful in allowing for continued economic growth while insuring environmental protection. It also helps the United States to be a leader in the export of pollution control technology.

Despite the success of the NSR program, we have been actively working with many different stakeholders on all sides of the equation to help find ways to make the program work more effectively. I described some of those in my written statement which has been submitted for the record. We have worked very hard to be inclusive and comprehensive in our analysis of the stakeholder concerns. Since 1992 we have held hundreds of hours of meetings actively seeking comments and recommendations from various stakeholders. We formed the NSR Reform Subcommittee of the Clean Air Act Advisory Committee, a group of experts from industry, environmental groups, and State and local governments, brought together for the purpose of making recommendations for improving the NSR program. We listened to the analysis and debate from a wide variety of often opposing viewpoints. We issued a proposed rule in 1996, took comments, and held a public hearing on that rule. Since then we have continued to have meetings with stakeholders. As recently as last week we held another meeting with an industrial group.

Our fundamental principle during this reform effort has been to promote more certainty and flexibility in the permitting process while maintaining at least the same level of environmental protection. We are examining the idea of promoting flexible plant-wide caps that would enable sources to make changes at their plant without meeting NSR's program so as long as the overall environmental cap is met. More examples are included in my written statement.

We are also considering other options to provide flexibility for a specific industry while protecting the environment. For example, we recently held meetings with our stakeholders to obtain views on the concept of a sector-based approach for utilities. This would tailor the NSR regulations in such a way as to address issues unique to the utilities while still providing the overall environmental protection envisioned by the NSR program.

We continue to discuss several issues with stakeholders and have not reached final decisions on the reform rule. However, we hope to complete the NSR rulemaking, as you indicated, later this year.

Mr. Chairman, this concludes my statement. I appreciate the opportunity to be here today and I would be happy to answer any questions you have.

Senator INHOFE. Thank you, Mr. Seitz. Mr. Seitz, I get conflicting reports as to the length of time it takes to apply for and to receive a permit under the NSR program. I know you keep records of these. Can you give us what your records show?

Mr. SEITZ. Yes. I'd be pleased to give that to you for the record, Senator.

Senator INHOFE. No, just for today's oral testimony, I'm sure you've looked at this before.

Mr. SEITZ. I was a little surprised by the comment of one to 2 years. I acknowledge that there are some permits that take over that period of time after completing the application, but we believe that the majority of those are issued within the timeframe of 12 months, as set forth in the statute. However, industry has brought to the table in the reform effort—I think the microchip, the computer chip was a good example you brought out—that they need the ability to make changes quickly in the permitting process. They need more certainty, more speed in the permitting process. So we are currently looking at that and hope some of the efforts in terms of PALS and the technology clearinghouse can address some of that.

Senator INHOFE. I'd like to have kind of an average just off the top of your head, 6 months, a year, 2 years?

Mr. SEITZ. I'd say it's probably from 9 to 12 months at this point in time.

Senator INHOFE. Nine to 12 months would be somewhat of an average?

Mr. SEITZ. Right.

Senator INHOFE. Now, who issues——

Mr. SEITZ. That's from the complete application. Sometimes there are problems getting a complete application. But once the application is in the hands of the States, I'd say 9 to 12 months.

Senator INHOFE. First of all, who receives the permit applications, the EPA or the States?

Mr. SEITZ. The States.

Senator INHOFE. The States. And then who reviews them at EPA?

Mr. SEITZ. Well, it depends on the program, sir. If it is a SIP-approved program such as in Oklahoma, the State is the primary reviewer during the public comment period on the permit. The EPA regional office provides comments on some permits, but not necessarily all permits.

Senator INHOFE. In planning new regulations which will result in the increase of permit applications, something that hasn't been talked about very much is who is going to pay for this? How much additional work load is going to be incurred in terms of the EPA, in terms of the State? Have you done a study of that, on work load, how we're going to accommodate that?

Mr. SEITZ. No, sir, I have not. We have not completed a study on that, yet. It's unclear to me at this point in time that as a result of the final reform package that we will have an increased number of permits that will actually go through the system. It is hoped that with some of the innovations such as plant-wide applicability limits, the process would actually, narrow that some. When we do the final rulemaking, we will have to put forward an analysis as to what the total cost and burden would be, which we have not done as of yet.

Senator INHOFE. Prior to the rulemaking?

Mr. SEITZ. Prior to the final rulemaking.

Senator INHOFE. Oh, OK, yes.

Mr. SEITZ. Yes.

Senator INHOFE. The other witnesses, Henson and others, I'll probably be asking you the same question, but I'd be interested in knowing how this—at our news conference, and I think Ted Strickland mentioned this too, what this does to our competitiveness if we have these lengthy permit periods of time, how do you think that would affect our competitiveness compared to other countries?

Mr. SEITZ. Again, planning is the cornerstone of this program, as I said. The intent of the program when Congress put it together is that as a plant expands and plans on increasing its capacity, the environmental protection is protection addressed as a critical component of that. So I would hope that in the permit process the industrial sector would consider environmental protection as essential to the permitting application, and we need to preserve that aspect of the program along with the reforms to expedite the permitting process. Again, that is part of the effort of the reform process we have underway.

Senator INHOFE. This is a concern to me because in Oklahoma we have some specific examples that I talked about the last time we had a hearing in Washington.

It's been suggested that the New Source Review reform process is being steered in the direction of trying to get the same emissions reductions from the same sources as the 8-hour ozone and fine particulates and NAAQS set aside—they've been set aside by the D.C. Circuit Court of Appeals. And the NOx SIP call and Section 126, we're talking about three different things which are pending before that same court. Now, you've heard this and you've talked about this before. What is the agency's response to that notion?

Mr. SEITZ. I don't quite even understand how one could say that the NSR program is supplementing the NOx SIP call under section 110 of the Act. NSR is a source-specific facility, case-by-case decision. As you know, the NOx SIP call was across a given region based on a nitrogen budget for each State.

Some of the alternative approaches we are examining in NSR reform voluntary approaches such as PAL or the sector-based approach for utilities. They clearly are voluntary programs and have nothing to do with the NOx SIP call.

Since it would be a voluntary offering, I don't know how it could be something that supplements the NOx SIP call.

Senator INHOFE. Yes, I'm running out of time here. Just one last question. In the January 3, 2000 issue of the well-known trade journal Electric Utility Week, Administrator Browner is quoted as saying in reference to a just announced final ruling granting the Clean Air Act, Section 126, petitions filed by the northeastern States asking for NOx emissions reductions from midwestern and southeastern States, "we're going to get there one way or another."

What do you think she meant by that?

Mr. SEITZ. I think the Administrator's position is that we are going to get the clean air. Every American is deserves clean air, and she meant that we have to work together to achieve that.

Senator INHOFE. Not to get to those standards that are under court review one way or another?

Mr. SEITZ. I didn't read it that way.

Senator INHOFE. OK, Senator Voinovich?

Senator VOINOVICH. When Administrator Browner appeared before our committee last week on her budget, she talked about overall reduction in the budget but an increase of 11 percent in the administrative part of the budget.

Are you aware of any additional money that's going to be made available for this procedure, the people that handle this New Source Review?

Mr. SEITZ. Senator, at this current time I am unaware of that. I'm not aware of what the final pass-back numbers would be.

Senator VOINOVICH. Well, I'm interested with talking about the timing though. The real decision on this, the application is submitted to the State agency and they go through it. But is it in Washington that that decision is made or is it made in the regional office in terms of this particular review?

Mr. SEITZ. In terms of the review and who conducts the review, that decision is in terms of the delegation. For instance, Ohio and Oklahoma have different types of programs. Maybe it would be helpful to describe them. The Oklahoma program is administered by the State under a State-approved regulatory program that was adopted in the Federal rulemaking. The State of Oklahoma issues the NSR permits.

The State of Ohio's program is delegated program. The State did not choose to get a federally approved program so, therefore, the State is acting as an agent for EPA. In Ohio when a permit is issued by the State it is actually a federally issued permit, and Ohio acts as the agent for EPA. So the regional office—it is in Chicago for Ohio—would be more closely involved. An appeal of that permit goes straight to the EPA.

It's my understanding the State of Ohio is working to change that now. This process contrasts with the appeals in Oklahoma, which go to the State.

So the decision on where the permit goes and how it is reviewed depends on that State's structure. In Ohio, the regional office is more involved. In Oklahoma, the permits would be decided on a case-by-case decision. The funding of the program is an overall budget decision that is made out of Washington.

Senator VOINOVICH. I'm interested in that. As I say, I'm a big fan of quality. And I know that as Governor of the State we had a lot of agencies that did a lousy job of permitting, and we made a real issue of that. We instituted quality management in our State agencies. I recall underground storage tanks. Ninety percent of the applications that used to be submitted were rejected because the people didn't understand the form. They spent a couple of months working on that issue, the people that actually issued the permits. They spent time with their customers, revised the application. Today there is only a 5 percent rejection. So that speeded up the process right off the bat, because people didn't understand the process.

Maybe it's a governmental thing, but I really want to know how you handle this. I want to kow what the manpower is and is it——

Mr. SEITZ. Well, in light of what you just said, particularly in terms of total quality and what you might do in the State of Ohio

or Oklahoma, the internal timeframe is governed by the State. EPA does not set that. The statute says 12 months. The period of time the State agency chooses to, say, take phase one or phase two, is totally within their discretion. So to the extent that some States have, as you said, maybe in Ohio with the total quality aspect of it, have implemented processing changes that make it more efficient, that is totally within the State's capability right now. I think through STAPPA/ALAPCO, which are the State and local air associations, share those experiences.

So within that timeframe the only thing we govern is the 12 months.

Senator VOINOVICH. Well, I'd like you to get back to me on that. I'd also like to know how much of EPA's new budget are they putting into the program.

Mr. SEITZ. I'd be glad to answer that for you.

Senator VOINOVICH. You're going to hear testimony today that will surprise you. People have been doing things according to the rules and all of a sudden they are finding out that they are supposed to have violated a process. They should have been able to get the permits reviewed and issued. Just what is the attitude of the agency toward those kinds of claims?

Mr. SEITZ. Well, most frequently, in the examples you've given I was actually sort of surprised at some of it. And you referenced some of it in your statement, Senator Inhofe. As mentioned, these rules were put out in 1980. Routine maintenance, or that issue of maintaining, was put in in 1988 and 1989, put out as guidance, and that was upheld in the courts. And since that time we, EPA, has received very few written requests for an interpretation of that definition. So I am somewhat surprised that if it is so confusing and confounded why we have heard so little? There are questions about the other programs I administer; and Senator Inhofe has had the opportunity to quiz me on some of them in the past. I get hundreds of requests for interpretation, whether it is a MACT program or Title I program.

So with respect to this issue, I receive relatively few questions in that area. In contrast, I receive lots of requests for information on modeling: how you do attribution, etc. On the issue of what is and is not routine—very few. I think we have to look closely at that as we go forward. I'm hearing that today.

Senator VOINOVICH. There is a question about whether or not when you're coming up with the final rules on this whether you're going to be concerned about electricity reliability. One of the things that is a big issue now with the proposed 85 percent on the NOx that the agency is requiring, is that many of the utilities are complaining about the fact that if they would go forward with that that they would have a real reliability problem. And there also is some real concern about ordinary maintenance of facilities that involve the well-being of people who are working for those agencies. And in terms of just providing reliable electricity for people that are—you know, the benefits of the company. What comment do you have about that?

Mr. SEITZ. Senator, as mentioned last summer when this first came up in connection with the SIP call, the Administrator said at that point in time if anyone is concerned about their ability to

produce electricity because of either brown outs or shortage contact us because we do not believe this program will jeopardize the power supply of this country.

With respect to the issue of whether or not routine maintenance can go on at a facility, as I said in my statement, the test here is really simple. I know there's a lot of debate around it, but the test here is really quite simple: Are there going to be emission increases as a result of what you're doing?

Senator VOINOVICH. May I ask one last question? I know I'm out of time here.

Senator INHOFE. Sure.

Senator VOINOVICH. The issue of cost benefit in making a decision, and based on the technology that's available, does that ever get into the decisionmaking process?

Mr. SEITZ. Specifically you're referring to the decision of whether to apply back the Best Available Control Technology—BACT. One of the factors in that decision is cost, like the age of equipment. So, yes, cost benefit is looked at in making decisions.

Senator VOINOVICH. Good.

Mr. SEITZ. We take a look at the incremental costs, the marginal costs, social impacts, cost of energy. Those are specific criteria that are set forth in the statute.

Senator INHOFE. Let me ask you one followup question and feel free to do the same thing.

Mr. Seitz, I understand that part of your proposed rule would require facilities to look at what they actually emit today and then compare that to what they potentially could emit after equipment changes. And it seems to me this is kind of apples and oranges, that any facility could potentially emit more than they actually emit without making any equipment changes. All they have to do is run at full speed or increase the number of hours that they're emitting more pollutants. Would it make more sense to compare the actual emissions before an equipment change to the actual emissions after an equipment change. It seems like you anticipate that everyone runs at full capacity a hundred percent of the time.

Mr. SEITZ. Well, again, Senator, I think you have to go back to another provision in the Clean Air Act about the contemporaneous period in which you determine what the actual is. So when you make a change you assess the last 5 years of emissions data. Then you project forward to see, based on the proposed changes, what you could do in the way of production. If, based on the proposed changes, you have the ability to produce 100 products an hour, instead of 10 products an hour, there could be more pollution. Granted you're not at that level yet. A source has the ability to say, ''We never plan to emit. We want to address the technology issue now and put the technology on.'' They would have, through the State permitting program, the ability to take on an enforceable cap to address that.

But the basic concept is if there is a potential to increase the emissions, then the impact on the environment has to be addressed.

Senator INHOFE. But why couldn't you just compare the present potential to future potential? Then at least you're comparing the same things.

Mr. SEITZ. Let's say that a facility in the last 5 years has only produced 10 units. However, when the plant was built 30 years ago, it was designed to produce 100 units. Is it fair to say that the design capability should meet an environmental permit that is based on 30 units 20 years ago should be the design criteria now, even though the standard has not been achieved in 30 years? We think that that's not what the statute——

Senator INHOFE. OK, I understand your answer. I disagree with it, and I'm going to be asking some of the—Panel 3 and 4 the same question.

Do you have any further questions of Mr. Seitz?

Senator VOINOVICH. No, I haven't.

Senator INHOFE. Thank you very much, Mr. Seitz. I appreciate your being here.

Audience speaker. Senator, would you indulge me for a second, please?

Senator INHOFE. No, sir, we won't. I'm sorry. I don't want to be rude, but we have to comply with our rules. This is the way things get out of hand. We would run out of time, sir. I'd ask you to please sit down.

I'd ask now Mr. Bynum to come forward. Most of the witnesses today are either industry or government, and I think Mr. Bynum is a hybrid. Which are you, Mr. Bynum?

Mr. BYNUM. I'm a hybrid. You're absolutely right, Mr. Chairman.

Senator INHOFE. By the way, I would like to have all of the panels to understand that you're entire statement will be made a part of the record, but for time sake we have to do this. And that's why I always regret having to not deviate from the published rules by not allowing people from the audience to join in. When we're on time constraints, that takes away from our invited witnesses.

Mr. Bynum?

Mr. BYNUM. Thank you.

STATEMENT OF JOE BYNUM, EXECUTIVE VICE PRESIDENT, FOSSIL POWER GROUP, TENNESSEE VALLEY AUTHORITY

Mr. BYNUM. Mr. Chairman, thank you for the opportunity to testify before the subcommittee today. In my testimony I am providing the committee with the views that are solely those of the Tennessee Valley Authority. I appreciate your interest in the Environmental Protection Agency's proposed changes to the New Source Review Program, which will have a lasting impact on the operation of individual fossil plants and, in fact, the reliability of our nation's electric system.

TVA has been operating various kinds of generating technology for more than 65 years and has substantial expertise in the maintenance of fossil plants. I am here today to represent TVA's dual responsibilities as a power producer and an environmental steward.

Although there has been some criticism of its complexity, the TVA believes the NSR program has generally been a success. The EPA has largely applied the program's requirements in a way that does not impede routine maintenance or efficiency improvements of the nation's electric generating resources. TVA believes such improvements, long a part of routine maintenance, are desirable to in-

sure a reliable supply of electricity and are in the public interest. As the person responsible for the operation and maintenance of 59 coal units, I urge great caution as EPA contemplates changes to the program. Unfortunately, some of the ideas being discussed can discourage such desirable improvements and have a detrimental impact on the electric utility industry's ability to safely and effectively operate our plants.

The current NSR regulations have long excluded routine maintenance, repair, and replacement projects at existing sources. Historically the EPA has employed a common sense understanding of the term that encompasses those maintenance activities that are customary in the industry but optimize reliability, safety, availability, and efficiency. It would be a serious mistake in its rulemaking for the EPA to change its historic interpretation of the definition of routine maintenance. The EPA should not make changes to the program that discourage utilities from making improvements that increase plant efficiency and improve reliability. The utilities in the eastern interconnect have strained to meet demand and keep the lights on the last two summers. Now more than ever utility maintenance programs are key to meeting demand and reliably serving the public.

TVA has recently released a technical report on routine maintenance on the TVA system and in the utility industry. This report demonstrates how important maintenance is for reliable service. I would like to submit a copy of this report for the record.

Senator INHOFE. Without objection.

[The referenced report follows:]

ROUTINE MAINTENANCE OF ELECTRIC GENERATING STATIONS

TENNESSEE VALLEY AUTHORITY

(Gerry L. Golden Manager, Production Technology Fossil Power Group)

EXECUTIVE SUMMARY

The Tennessee Valley Authority (TVA) has more than 65 years of experience in maintaining electricity-generating units with a wide range of unit size and technologies.

This report examines TVA's maintenance philosophy and highlights specific TVA and industry routine maintenance activities. TVA and utility maintenance practices have as their goal unit reliability and availability and safe working conditions. This report presents maintenance case studies including:

- Cyclone replacements (at least 300 replaced industrywide [43 percent]).
- Draft system replacements (at least 79 replacements of forced-draft systems identified in a sample of 151 boilers [52 percent]).
- Reheater replacements (231 in a sample of 190 generating units [121 percent—some units had multiple replacements]).
- Economizer replacements (98 replacement projects identified in a sample of 202 generating units [49 percent]).

A large number of variables affect unit components' useful lives and dictate varying maintenance responses. These responses range from simply lubricating equipment to replacing components with improved materials to lessen component degradation and downtime. TVA's analyses indicate that component replacement does not occur at a certain age but varies widely, both within the TVA system and elsewhere in the industry.

The case studies presented herein are only illustrative of the broad range of maintenance, repair, and replacement activities necessary to ensure safe and reliable production of electric power from coal-fired units. They do, however, provide insights into commonly encountered failure mechanisms and the advancements in assessment and repair techniques that have occurred over the last three decades.

Introduction

A steam electricity-generating unit is a complicated machine consisting of thousands of separate parts and components that must be operated together in an integrated fashion to produce electricity. Like any complex mechanical system, an electricity-generating unit may suffer impaired performance caused by defects in design or manufacture, extreme operating conditions, or catastrophic failure. This impaired performance affects the economic performance of a unit and employee safety. In addition, it negatively impacts the ability to supply adequate and reliable electric energy to the public. To complicate matters, the unit's component parts are subject to different operating conditions and deteriorate at different rates. To ensure reliable integration and operation of all of these parts, an active maintenance program is necessary.

The Tennessee Valley Authority (TVA) has more than 65 years of experience in maintaining various kinds of power-generating technologies. In the early 1930's, TVA began operating and maintaining hydroelectric units. When the public's demand for electricity exceeded the region's hydroelectric generation potential, TVA turned to coal-fired steam generating units. Output from its hydroelectric and coal-fired units was later supplemented by generation from nuclear units. Whatever the choice of fuel or generating technology, maintenance has been and continues to be the key to reliable operation of a unit throughout its useful life.

In a 1972 report, two TVA power-system managers, T. H. Gladney and H. S. Fox, described TVA's maintenance experiences to date and its maintenance philosophy. Maintenance practices and techniques have improved since then, with better analytical tools and more experience, but the maintenance philosophy has remained unchanged for more than 25 years. TVA and other power-system operators try to attain and maintain the highest practical availability and reliability of generating assets while taking into account safety and economic and financial considerations. Only through careful maintenance of generating assets can the public's need for electric energy be reliably and safely met.

This report builds on the TVA maintenance activities documented in the earlier Gladney and Fox work. First, information about TVA's power system is provided. The report then discusses the life of a generating unit, the utility obligation to serve, and overall maintenance concepts in order to provide the fuller context in which maintenance decisions are made. This is followed by several case studies of specific maintenance projects and information about the frequency of similar maintenance activities on the TVA system and elsewhere.

TVA's Electric Power System

TVA is an agency and instrumentality of the United States created by the Tennessee Valley Authority Act of 1933. Congress has tasked TVA with the development and conservation of the resources of the Tennessee Valley region in order to foster the region's economic and social well-being. One component of TVA's regional resource development program is the generation, transmission, and sale of electric power. TVA's power system now serves approximately 8 million people in parts of seven States.

Generation sources currently operated by TVA include 11 coal-fired power plants, 29 hydroelectric plants, 4 gas-turbine plants, 1 hydro pumped-storage facility, and 3 nuclear plants. TVA's 11 coal-fired power plants consist of 59 units, which are located in Alabama, Kentucky, and Tennessee. These units represent approximately 60 percent of the installed generating capacity on the TVA system.

TVA's oldest active coal-fired unit was placed into service in late 1951; the newest unit was placed into service in 1989. Four of the units are supercritical units. The unit boilers are a diverse mix of burner types and configurations: 26 are tangentially fired; 24 are wall-fired; 2 are cell burners; 6 are cyclones; and 1 is atmospheric fluidized-bed combustion. Unit sizes range from 125 MWs to 1,300 MWs (nameplate capacities). These boiler types and sizes are typical for more than 90 percent of the United States coal-fired boiler fleet. All of the boilers originally burned medium- to high-sulfur eastern coals, but a number of them currently burn coal blends consisting of low-sulfur western and medium- or high-sulfur eastern coals. TVA's nominal fossil fuel-fired capacity is now 19,917 MWs.

TVA is widely recognized as one of the leaders in the utility industry. Throughout its history, TVA has championed the evolution of electricity-generating technologies to improve efficiency and reliability and to reduce costs. Since the 1960's many of the major step increases in the size and economic performance of coal-fired generating plants have been taken by TVA. These steps included the construction and operation of:

- Gallatin Unit 1—first 300 MW tangentially fired unit in 1956;
- Widow's Creek Unit 7—first 500 MW tangentially fired unit in 1961;

- Colbert Unit 5—first 500 MW wall-fired unit in 1965;
- Paradise Unit 1—first 700 MW unit in 1963;
- Bull Run—first 900 MW unit in 1967;
- Paradise Unit 3—first 1100 MW unit in 1970;
- Cumberland Unit 1—first 1300 MW unit in 1973; and
- Shawnee Unit 10—first utility-scale (160 MW) atmospheric fluidized-bed combustion unit in 1989.

As Gladney and Fox stated, these units ". . . represented the largest units the turbogenerator and steam-generator manufacturers were capable of designing and building; consequently, maintenance problems associated with prototype units were faced during the entire period."

In its 1955 Annual Report to the President and Congress, TVA observed:

Because of the size of the TVA power system and its region-wide integration, TVA has been able to take advantage of the economies of "bigness" and to stimulate advances in steam-plant technology. Turbogenerators of unprecedented capacity and greater efficiency have been purchased in multiple units of 2 to 12. As a result, the new TVA steam plants have made excellent field laboratories for the manufacturers, providing an opportunity for inspecting and testing a whole series of machines under operating conditions. The later machines in each series could be improved from the experience with earlier installations.

Many of the maintenance practices developed by TVA on these prototype units therefore became the practices that were adopted and refined by others in the industry.

Today, many of TVA's generating units are among the top performers in the country, ranking in the top decile in efficiency and reliability.

The Integrated Steam Electric Generating Unit

A typical steam driven electricity-generating unit is a complex assembly of off-the-shelf components and custom-engineered equipment. Steam: Its Generation and Use (40th edition 1992) by Babcock and Wilcox, and Combustion Fossil Power (4th edition 1991) by Combustion Engineering Inc., describe in detail from the equipment vendors' perspective the various kinds of boilers and their component parts.

The design, installation, and operation of boiler and turbogenerator component parts must be fully integrated in order to achieve the ultimate objective of generating electricity reliably, safely, and at the least cost possible. This integration is, even for the simplest, smallest units, a major undertaking. Thousands of components and pieces of equipment that are designed and supplied by different firms must ultimately be properly assembled, tested, and, almost always, tuned and refined before a generating unit can be initially connected to the grid. Furthermore, it is not unusual for replacements of equipment and systems and refinements to operational procedures to continue for months and years before a unit achieves its efficiency and reliability objectives.

Maintaining integrated operation of all components is difficult because of the large number of components and the varying stresses on components. Failure of a component, or its failure to meet performance specifications, results in the inability of a unit to perform efficiently or to generate at design capability and may even prevent the unit from generating at all. This is true for almost all components. Failure of a critical electrical relay, sensing device, or valve can interfere with a unit's ability to operate properly as much as can failure of larger boiler or turbine components.

The components and equipment of a generating unit face a wide range of operating environments and service conditions. These conditions range from the heat- and humidity-controlled environment of a control room to the extremely harsh environment inside a large furnace. Heat transfer surfaces in a boiler must retain adequate structural integrity to contain water/steam at pressures up to 4500 psi, the approximate equivalent to an ocean depth of two miles.

Components must retain this structural integrity while being exposed to furnace temperatures exceeding 3000F; to highly corrosive gases; to deposition of corrosive solid materials; and to erosion caused by high-velocity, abrasive solid materials. Solid particles and water droplets traveling at supersonic velocities bombard steam turbine blades. Dynamic forces from the formation and collapse of steam bubbles can gouge chunks of metal from seating surfaces and rotating elements of control valves and pump impellers. Insulation inside electrical generators must maintain integrity while withstanding up to 24,000 volts.

Because of this wide variation in conditions of service, the service lives of individual components differ considerably. This affects the ability to maintain reliable integrated operation. Even the various components of a system or assembly do not have the same expected service life. For example, the rotating elements of a steam tur-

bine, under design conditions, will require repair or replacement before the stationary components of the turbine. The superheater section of a boiler, which operates in a substantially more hostile service environment than the economizer section of the same boiler, typically has a shorter life than the economizer—even though the superheater is made of higher grade materials that can tolerate very adverse conditions.

The power system may fail to meet its performance and reliability expectations because of design and integration errors. Components often fail to achieve their initially anticipated service lives. Poor quality control, manufacturing errors, design errors, and imperfect information regarding conditions of service can result in exposure to stresses higher than anticipated by the design engineer. Unexpected trace materials in the fuel supply can result in higher corrosion. Improper operation due to human error or failure of control components may also shorten component lives. For example, a single overheating event can occur early in the life of a plant and shorten the useful life of an entire section of heat transfer surfaces within a boiler (e.g., a superheater or reheater). All of these circumstances eventually require some form of maintenance response to ensure safe and reliable operation.

Advances in industry standards, metallurgical developments, and improvements in inspection procedures and performance-testing techniques can also result in reduced life for components. Codes and standards exist to minimize the threat of a major safety-related failure. Industrial experience and increased knowledge of materials behavior can result in changes to these codes and standards that require removal of components from service earlier than anticipated by the designer. For example, in 1965 and again in 1991, the American Society of Mechanical Engineers reduced the allowable high-temperature stress levels for 11/4 Cr. 1/2 Mo steel (chrome-molybdenum, also known as T–11), which was commonly used in the waterwall, reheater, and superheater sections of a boiler. This significantly affected the assessment of remaining useful life for some of the boiler sections fabricated from this material. Similarly, the development of improved nondestructive examination techniques for boiler tubes and other components allowed sophisticated assessments of the remaining useful life of pressure parts to be conducted, which in turn allowed for planned replacements of wearing parts to be undertaken before a forced outage required emergency repairs.

Life of a Generating Unit

Given the variations in the design life of individual unit components and systems, the life of a generating unit depends upon how a unit is operated, how well it is maintained, and other external factors. As a result, there is no preordained expected life of a generating unit. For TVA and other generating utilities, there are in fact two different concepts of expected life.

First, there is the project planning life or accounting life. When a decision is made to put a new generating unit on line, a minimum expected lifetime is defined for accounting or planning purposes. In other words, for a project to be viable, it must be expected to perform long enough to generate sufficient revenues to provide a minimum targeted return on investment. In the case of for-profit entities, this minimum expected life or "accounting life" also establishes the depreciation schedule, an important parameter in the economic evaluation of a new project because of tax considerations. TVA periodically adjusts its depreciation schedules to reflect current estimates of a plant's remaining useful life. It is not unusual, however, for a generating plant to become fully depreciated yet remain in service.

Second, generating units have a useful life, one that is based on a dynamic assessment of unit-specific internal and external factors to determine its continuing viability. Just as automobiles are not retired once the car loan is paid, generating units are not retired from service at the end of their accounting lives simply because they have been fully depreciated. Rather, they are retired when they no longer remain viable assets. This means that units are removed from service when either:

The revenue they generate is inadequate to cover fixed plus variable operating costs and to provide sufficient return on investment in needed component restorations; or Technological advances provide the opportunity for an investment in new facilities to generate greater return on investment and lower cost of electricity than could be achieved through continued operation of the existing facility.

Maintenance, repair, and replacement of unit components are necessary to achieve reliable and safe operation of a generating unit throughout this useful life. Since 1940, TVA has permanently shut down 24 steam-driven electrical power plants. TVA acquired 23 of these plants from other power companies or from the government. One of the 24 plants shut down was the Watts Bar coal-fired plant, the first steam plant designed and constructed by TVA. Many of the plants included in the acquisition of entire utility systems had internal combustion engines and

were retired immediately upon their acquisition. Others were coal-fired plants of varying size and description that were shut down from 1941 to 1997 based on system needs and the relative economics of the individual plants.

Review of this retirement history shows that retirements of coal-fired units on the TVA system have been limited to small (<60 MW) units that operated at low steam pressure and low temperature and had high heat rates (low efficiency) compared to other existing TVA units. Those units identified in Table 1 represent the largest and most efficient of the coal units shut down by TVA.

Table 1

Thermal Conditions of Retired TVA Fossil Units

	Steam Pressure (PSI)	Steam Temp (T)	Estimated Heat Rate (Btu/kWh)
Parksville	250	575	21,000
Hales Bar	365	725	18,000
Watts Bar	865	900	11,400*

*Design Value

As demand grew on the TVA electrical system, substantially larger, more efficient generating units were added. The significantly lower production cost of these new units resulted in the older units being used less. This decrease in utilization led to the old unite' net annual revenue going negative (often, even net generation would go negative). Retirement of the old units typically followed soon thereafter.

Table 2 was compiled based on information obtained from a review of TVA's Annual Reports to the President and Congress in 1957–1959. Table 2 compares the average cost and capacity factor of the TVA-acquired units that were in service and the average figures for the TVA coal system overall. For example, in the late 1950's, the average cost of electric power generated by TVA's old, acquired units was about 4.4 to 6.5 times the cost of electric power generated by TVA's new coal-fired units. The acquired units were all retired in the early to mid-1960's. (TVA retired the Parksville, Bowling Green, and Watauga units in 1960, the Nashville plant in 1962, Hales Bar in 1963, Memphis in 1965, and Wilson in 1966.)

Table 2

Financial Performance of JVA Coal Units 1957–1959

	1957	1958	1959
TVA Coal System—Average Cost ($/MWh)	2.773	2.898	2.793
Effective Capacity Factor (%)	90.110	77.960	82.200
TVA-Acquired Units.—Average Cost ($/MWh)	17.918	12.640	17.200
Effective Capacity Factor (%)	4.440	4.740	3.130

* Generating units acquired by TVA from other power companies or from other government agencies from 1933 through 1950. Plants still active in 1957–1959 included Wilson, Nashville, Hales Bar, Parksville, Watauga, and Bowling Green.

This retirement sequence demonstrates that neither the accounting age nor the actual age of units dictates when units are retired. TVA's 1960 Annual Report indicated that the Nashville, Memphis, and Parksville units had reached the end of their accounting lives; that is, they were fully depreciated. Yet, the 1960 retirements included the Bowling Green and Watauga units but not the Nashville and Memphis units. Table 3 provides a summary of the age of some of these acquired facilities at the time of their retirements. Even in the 1950's and 1960's, unit age at date of retirement ranged from just less than 30 to over 60 years, confirming that plant age was not the motivation behind retirement.

Table 3

Age of TVA Coal-Fired Plants at Retirement

Generating Unit	Retirement Date	Age at Retirement
Hopkinsville	1954	41
Parksville	1960	46
Bowling Green	1960	28
Watauga	1960	38

Table 3—Continued

Age of TVA Coal-Fired Plants at Retirement

Generating Unit	Retirement Date	Age at Retirement
Nashville	1962	61
Hales Bar	1964	40
Wilson	1966	50

TVA's most recent plant to be shut down was the Watts Bar Steam Plant. This four-unit, combination wet-bottom/dry-bottom boiler plant was the first coal-fired plant actually built by TVA. The units began operation in 1942–45. In only one decade, the unite' operation was shifted from base-load to peaking mode following completion of the Kingston units in 1954–55. The technology of coal-fired generating stations had evolved considerably during this period because of increases in operating temperature and pressure and the addition of steam reheating to the thermodynamic steam cycle. As a result, the new Kingston units were approximately 20 percent more efficient than the Watts Bar units (design heat rates of 9,400 Btu/kWh compared to 11,400 Btu/kWh at Watts Bar) and produced electricity at costs substantially lower than the Watts Bar units.

The generation from Watts Bar continued to decline as other generating units were added to the TVA system until, as early as 1960, the net generation of the plant was negative—it consumed more electricity when it wasn't operating than it generated when it was operating. The units were effectively retired at ages ranging from 15 to 18 years. However, Watts Bar's value as backup capacity exceeded the cost to maintain it as a viable generating asset, so it continued to be staffed and remained capable of operation. This changed in 1982 when an analysis indicated that, for the number of hours of expected operation, it would be more economical to generate the standby power from combustion turbines than to maintain full staffing and absorb the total fixed cost of the Watts Bar facility. As a result of this analysis, the plant was shut down and put into mothballed condition. Subsequently, in 1997 Watts Bar was permanently shut down—55 years after going into service.

Technological advances have continued to improve the efficiency and reduce the variable operating costs of new generating units. However, these more recent efficiency improvements have not approached the giant strides that were made in the 1950's and 1960's. Additionally, the economy-of-scale factor that allowed the fixed cost of the replacement capacity to be relatively small prior to 1970 is no longer relevant because there has been no increase in the size of generating units since the early 1970's. In fact, almost all of the new generating units added in the 1990's have capacities considerably smaller than those built in the late 1960's and early 1970's. Simply stated, the more recent limited improvements in unit operating efficiencies are not sufficient economically to justify the replacement of existing units, especially when the public's demand for electricity has continued to increase.

1 Refer to the care study on reheater replacement on p. 28 of this report for additional details.

Service Mandates

The TVA Act requires TVA to provide an ample supply of electric power to aid in discharging its congressionally mandated responsibility for the advancement of national defense and the physical, social, and economic development of the TVA region. The TVA Act also requires TVA to provide power at the lowest feasible rates, which in turn requires that TVA generate power at the lowest feasible cost.

Maintaining generating units to ensure they are available to generate when needed is a critical element of any program to ensure reliability of supply. Maintenance activities are also necessary to reduce costs. If generating are not reliable, more capacity must be installed (or obtained from some other power supplier) to ensure that total energy needs are met. Furthermore, if the lowest cost coal-fired units are not fully available when needed, energy needs must be met from generating units with higher production costs.

As a member of the North American Electric Reliability Council[2] (NERC), TVA is also obligated to help preserve the reliability of the national electricity trans-

[2] NERC is a not-for-profit organization responsible for promoting the reliability of the electric supply for North America. This mission is accomplished by working with all segments of the electric industry as well as customers. Electric utilities formed NERC in 1968 to coordinate efforts to avoid blackouts such as the November 1965 event that left 30 million prople without power in the northeast USA and Ontario, Canada. NERC reviews the past for lessons learned

mission and distribution grid. NERC's Operating Policy 1, Section C, defines the responses required of participating utilities in order to maintain acceptable frequencies at the transmission interfaces between entities. Upsets such as loss of a major generating unit on another utility's system can require TVA to activate its standby generation facilities or start idle ones. In addition to having an obligation to respond reliably to such events, TVA must minimize the number of events that are initiated on its system. Reliable generation and the ability to control the times when generating units operate or are shut down are crucial to fulfilling this obligation.

In addition, TVA must operate its generating units and transmission assets in a manner that fully protects the health and well-being of its employees. As a result, TVA strives to promptly correct conditions that might lead to an unsafe or unhealthy working environment.

Other companies that own and operate electricity-generating facilities for profit have also long been under a legal duty to maintain and to operate their facilities in a manner that ensures a safe, efficient, and reliable supply of electricity to their consumers. This legal duty is described in the utilities' compacts with their public service or public utilities commissions (PUCs). Activities aimed at improving or maintaining the reliability and efficiency of generating facilities are also subject to public scrutiny through reports to State PUCs, to the Federal Energy Regulatory Commission (FERC), and to the Energy Information Administration (EIA) within the U.S. Department of Energy.

Theory of Maintenance

To fulfill their respective obligations to serve, TVA and the rest of the electric utility industry have developed a very simple maintenance philosophy—maintain the reliability of generating units in a way that preserves the value of the asset and minimizes the cost of electricity. For some maintenance activities, this simple statement is equally simple to implement. However, for other activities, determining the appropriate approach may involve more complicated engineering and economic evaluations. Furthermore, the conclusions that are reached today may not be valid at some future date because of changes in the technology or economic circumstances.

Under this maintenance philosophy, routine maintenance of components of a generating unit generally falls into three categories. It can be proactive, reactive, or predictive.

Proactive Utilities routinely change lubricants, clean lubricants, replace gaskets, repack pump seals, etc., based on fixed calendar schedules or hours of service—regardless of the condition of the equipment. Typically, major overhauls of equipment have also been performed on a predetermined schedule based on manufacturers' recommendations or utility experience. Improvements in monitoring and diagnostic capabilities in recent years have enabled plant operators to reduce the level of this proactive maintenance in favor of the more cost-effective "condition based" or predictive maintenance.

Reactive Reactive maintenance is routinely performed when components or systems fail or experience performance degradation. This may entail replacement of components with identical parts, replacement with components with improved design or materials, replacement followed by changes in operating procedures, or replacement of an entire assembly or system that includes the failed component. The actions taken following a failure are determined by an economic evaluation that includes consideration of the immediate needs of the generating system, impact of the failure on unit operation, the frequency of the failure, and the availability of alternative solutions designed to prevent similar failures in the future.

When a failure results in loss of generating capability of a unit, either partial or total, the economics normally dictate choosing a maintenance solution that minimizes lost generation. This sometimes results in an immediate response to restore unit capability followed by a later action to avoid future failures. For example, consider the case of a tube failure in the reheat section of a steam generator.

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and monitors the present for member compliance with published policies, standards, principles, and guides. NERC assesses the future reliability of the bulk electric systems in North America. NERC's owners are ten regional councils whose members come from all segments of the electric industry—investor-owned Federal State/municipal and provincial utilities electric cooperatives, independent power producers, power marketers and electricity customers. TVA is a member of Southeastern Electric Reliability Council (SERC). NERC governance is by a board of trustees comprised of 47 electric industry executives. TVA has representation on the board of trustees. Operating guides and policies are developed and revised by committees comprised of members from the ten councils. Guides and policies are approved at various levels and ultimately by the board of trustees (Information from NERC's Web site January 2000—http://www.nerc.com)

If the damage is isolated to a single tube, that area of the tube is cut out and replaced, and the unit is returned to service. If there is visible collateral damage or if it is clear from initial analysis and review of operating history that other tubes in close proximity to the failure have been exposed to similar conditions that would make their early failure likely, a larger number of tubes may be replaced before the unit is returned to service. In this case, reactive maintenance is augmented by a proactive component replacement in order to avoid future failures that would result in loss of generation or create safety risks.

If it is determined that the root cause of a failure is a condition that has exposed all or a large number of the reheater tubes to increased risk of failure, the economic analysis may indicate that replacement of the entire reheater is needed to maintain unit reliability and safety and that replacement is the most cost-effective approach to maintaining system reliability. Such a condition might result from identification of a design or materials deficiency, operational errors such as temperature or water-quality excursions, or changes in the condition of service such as might result from unexpected changes in fuel combustion characteristics due to variation of properties within a coal seam. The economic analysis would indicate that the loss of generation and wear and tear on the unit resulting from anticipated failures and shutdowns justify the investment needed to replace the reheater.

Reactive maintenance can also be initiated by discovery of conditions that will lead to component failure if not corrected. If evidence of damage is found during inspections, a similar economic analysis is performed to determine the appropriate response. When the condition is detected prior to failure, however, repair of the component may also be a viable option. For example, discovery of cavitation damage at the suction of a pump could lead to weld repair of the pump impeller, replacement of the impeller, replacement of the impeller with improved materials, reconfiguration of the suction piping, or changes to the system upstream of the pump. The selected course of action would depend upon the costs of the alternative solutions and the benefits each solution would provide to system reliability.

Predictive As technology has advanced, so have the maintenance tools used by the electric utility industry. Advances in equipment-monitoring capability and analytical techniques now achieve many of the benefits of proactive maintenance while avoiding the costs of inspecting and overhauling equipment that is operating well and poses no current threat to unit reliability or employee safety. Predictive capability also allows threatening conditions to be discovered and mitigated prior to failure, thus avoiding the cost of lost generation, wear and tear on equipment that occur during the shutdowns and startups that accompany failures, and safety risks associated with a failure.

Examples of predictive or condition-based maintenance are plentiful. Deterioration of a piece of rotating equipment can now be discovered by spectral analysis long before vibration reaches levels that would have been detectable with originally installed equipment. Portable vibration-monitoring equipment allows this analysis technique to be extended to components that have never previously been equipped with any type of vibration-monitoring equipment. Evaluation of metallurgical samples now enables the condition of tubing or other structural members to be determined and the remaining service life of the component to be predicted with increased precision. This allows the replacement of components before failure while fully utilizing the life of the component. Modern computational fluid dynamics capabilities allow the prediction of corrosive conditions within boilers that may result from installation of low-NOx burners. This enables localized mitigation techniques such as protective cladding to be applied.

Timing of Maintenance Activities

The economic evaluation of maintenance activities at a generating unit is dependent upon a total generating system optimization that assigns a role and set of operating objectives to each individual unit. Unit roles and objectives change because of independent factors that include changes in fuel costs, overall economic conditions, and the condition of other units in the operating system. As a unit's role changes, the maintenance practice for that unit may also change.

For example, a unit operating as a "swing" or load-following unit affords more opportunities to patch or replace failed components one at a time without severely impacting systemwide reliability because system load demand does not require that the unit be operated continuously. (It should be noted that this swing mode of operation might, in fact, create more opportunities for failure because of the thermal, mechanical, and electrical cycling of equipment and systems.) However, conditions on the operating system (such as loss of another generating unit for an extended period of time) can quickly change the role of the unit to base-load operation. Because a base-load unit is expected to operate continuously, opportunities for failure-

driven maintenance are less frequent and certainly more costly. Proactive replacement of a complete assembly of components that have failure potential, rather than reactive replacement of individual components, may become economically justified with the increase in production rate or hours of operation.

Many of TVA's coal-fired units experienced a major change of roles in the mid-1980's when TVA decided to shut down all operating nuclear units for an extended period because of safety concerns. The reliability of the coal-fired units during this period became critical to meeting system demand and fulfilling TVA's mission and obligation to serve.

Decisions to repair or replace and the scope of the repair or replacement are not based only on assessments of the least-cost approach to maintaining the requisite reliability of TVA's generating and transmission system. The evaluations of options at a generating unit must also include consideration of the condition of the rest of the electrical system and the general economy as well as the safety of TVA employees.

Technologically Superior Replacement It has been the common practice within TVA and the utility industry for decades to replace components and systems with state-of-the-art equipment that is often more reliable or more efficient than the original, sometimes obsolete, component. It is also typical for maintenance activities to include improved maintenance and operational practices that respond to conditions experienced during actual operation of the unit. The following discussion lists specific examples of these practices on the TVA system.

Replacements with improved design or materials

- Boiler feedpump recirculation valves for supercritical units underwent a complete evolution of materials and design and were replaced numerous times on many units.
- Cooling tower fill was replaced with fill systems that had better structural and thermal properties and/or eliminated asbestos materials.
- Metallic expansion joints were replaced with more durable fabric joints.
- Insulation of generator stator bars was upgraded because of continuing failures of the originally supplied design.
- Steam turbine blade shape and materials of construction have been improved with resultant increases in thermodynamic efficiency and reliability.
- Feedwater heaters have been completely retubed with new materials that have improved the reliability of the heaters with resultant increases in thermal efficiency of the generating units.
- Analog control systems have been replaced with digital systems that provide increased control flexibility and accuracy and improved reliability.

Improved maintenance tools or operational practices:

- Continuous-cleaning systems for condenser tubes have increased efficiency through improved heat transfer capability and increased reliability by eliminating the need for unit outages or short-term load reductions to manually clean tubes.
- Vibration-monitoring systems with expanded capability have provided increased analytical capability and have increased the number of pieces of rotating equipment that can be monitored. This has resulted in improved reliability by making maintenance programs more effective and avoiding forced outages. Continuous-emissions-monitoring equipment has been added to improve combustion controls and overall thermal efficiency. Continuous-cleaning and filtration systems have been added to lubricating oil systems of turbine generators and other large rotating equipment to improve bearing life and decrease bearing-related forced outages.
- More recently, artificial intelligence control systems have been added to continuously optimize unit efficiency while minimizing pollutant emissions.

TVA Historical Practices

The overall maintenance philosophy described above has been in place at TVA for many years. This philosophy is reflected in a report presented to the American Power Conference in 1972, "TVA's Power Plant Maintenance Program" by T.H. Gladney and H.S. Fox. At the time of that report, TVA's oldest coal-fired plant had been in service just over 20 years. Many of the units were less than 10 years old. The report clearly stated TVA's approach to maintenance:

In an effort to maintain unit reliability, major replacement or rehabilitation in areas where excessive tale failures occur is made after an evaluation based on loss of generation, cost of repairs, and damage to the and from frequent startups and shutdowns indicates it is justified.

Examples of the types of routine maintenance activities and projects that were identified in the report after less than 20 years of operation include the following.

- In one family of 14 similar turbines, 3 high-pressure spindles had to be replaced because of creep-rupture cracking.
- Another high-pressure spindle was replaced and two intermediate-pressure spindles were on order following discovery of unacceptable cracks in the rotor bore.
- Steam chests were replaced on two 700 MW units after only 8 years of operation.
- Four generators required complete stator rewinding with upgraded insulation material, and 42 percent of the total generator fleet required partial replacement of bars.
- Although the projects had not yet been implemented, the decision had been made to pressurize the penthouse on all pressurized furnaces.
- Most crotch tubes, reentrant throat tubes, wrapper tubes, and face tubes had been replaced at least once on all cyclones of two 700 MW units, and it was thought that replacement of all cyclone tubes would be required within 3 to 5 years. (See Paradise Unit 1 Cyclone Replacement Case Study later in this report.)
- Of 41 low-pressure heaters using admiralty tubing, 14 had been retubed using better quality copper-nickel material and all others were anticipated to require retubing in the near future.
- Stainless steel tubes were removed, heat-treated, and reinstalled in the superheater and reheater sections of 11 steam generators.
- The return bends in all reheater pendant elements of two steam generators were redesigned and replaced.

These maintenance activities left the basic design of the steam/heat cycle and the maximum heat input to the furnace unchanged. Within these overall design constraints, however, all of these maintenance activities were intended to improve the reliability or efficiency of the generating units.

Case Studies

The same TVA maintenance philosophy has been consistently applied since the Gladney-Fox report. Four case histories of maintenance projects are presented below. Each case presents a discussion of the component, its function, and its conditions of service; the relevant operational history of the component; alternatives considered; and the rationale behind the maintenance decision. This specific case is then extended to analyze the history of replacements of the component on both the entire TVA coal-fired system and a larger data set that represents either the entire electric utility industry or a large segment of the industry.

Cyclone Furnace Replacement

Cyclone Background

As related in Steam: Its Generation and Use,[3] cyclone-fired boilers were developed by Babcock and Wilcox (B&W) to burn coals with low ash-melting (fusion) temperatures that are not well suited for pulverized-coal (PC) combustion. The ash from these coals would enter the superheater of a PC unit in a molten state and create severe slagging and fouling problems. The "cyclone" design developed by B&W addressed this problem by deliberately melting as much ash as possible and draining it from the bottom of the furnace. This kept molten slag out of the superheater and substantially reduced the total amount of ash that was transported out of the boiler with the flue gas (fly ash). The cyclone design also had these collateral benefits:

- Eliminated the need for high-cost and high-maintenance pulverizers.
- Resulted in overall smaller furnaces (with the associated reductions in powerhouse dimensions).
- Required smaller particulate collection equipment due to reduced fly ash loading.
- Opened the market to a range of fuels that were not usable with pulverized-coal firing.

The design objective was accomplished by creating a zone where combustion takes place outside the main furnace. The hot flue gas and molten slag then discharges into the main furnace, with the gas being cooled and discharged from the top of the furnace while the molten slag is kept at elevated temperatures and is drained through the main furnace bottom. This allows very high temperatures to be maintained in the combustion zone while the majority of the evaporative heat transfer occurs in the main furnace.

These combustion zones or "cyclones" are horizontally oriented, cylindrical barrels that attach to the sides of the main furnace. Cyclones range from 6 feet to 10 feet in diameter. As few as 1 or as many as 23 of these cyclones are attached to the

[3] Babcock and Wilcox, Storm: Its Generation and Use, 40th edition, 1992, pp 14–1–14–11

main furnace of different units. The term "cyclone furnace" is used to describe both the individual cyclones and the total furnace assembly of a cyclone-fired unit. The cyclones are a water-cooled, tangent tube construction, but a thick layer of refractory lining is used to protect the tubing material while allowing the sustained high temperatures (greater than 3000F) needed to consistently melt the ash. BOW describes the operation of cyclones as follows:

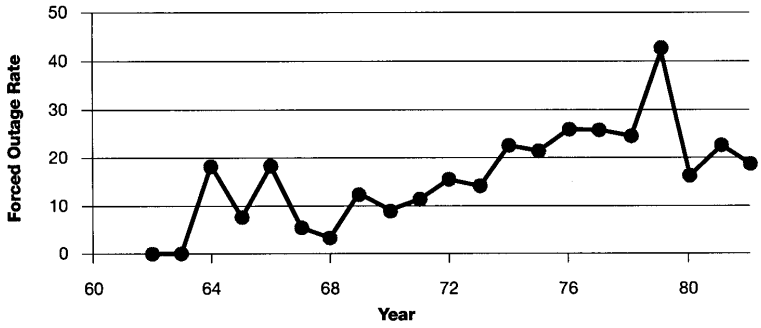
Crushed coal and some air . . . enter the front of the Cyclone through specially designed burners in thefrontwall of the Cyclone. In the main Cyclone barrel a swirling motion is created by the tangential addition of the secondary air in the upper Cyclone barrel wall. A unique combustion pattern and circulating gas-flow structure result. . . . The products of combustion eventually leave the Cyclone furnace through the re-entrant throat. A molten slag layer develops and coats the inside surface of the Cyclone barrel. The slag drains to the bottom of the Cyclone and is discharged through the slag tap.[4]

While cyclones achieved their design objectives, they also presented some difficult problems. The introduction of crushed coal and air at high velocities resulted in erosion problems, particularly in areas of the cyclone that do not form a protective slag layer. The hot, molten slag environment also introduced high risk for corrosion damage to the water-cooled tubes. Generally, the refractory material would protect the tubing. However, in areas where refractory eroded, cracked, or otherwise was removed from the tubing, the tubing's exterior surfaces would be subjected to the corrosive matter (such as iron sulfide) and rapidly lose metal thickness and strength. As a result, cyclones were plagued by tube failures that resulted in forced outages and decreased reliability. In the face of these cyclone failures, B&W developed rehabilitative repair and replacement strategies, such as welding flat steel stock onto tube surfaces in areas of high erosion potential and using a high-density pin-studding pattern to better hold refractory in place.

Paradise Unit 1 Case Study

Unit 1 of the Paradise Fossil Plant (located on the Green River in Muhlenberg County, Kentucky) is a 700 MW (nominal) cyclone-fired unit that was put into service in 1963. It has 14 ten-foot diameter cyclones—7 on each of the front and rear walls. Its boiler produces steam at 2450 psi", 1003F. Within its first year of commercial operation, the unit began experiencing failures of cyclone tubes. These failures increased in frequency such that by the time of the Gladney and Fox report in 1972, most of the crotch tubes, reentrant throat tubes, wrapper tubes, and face tubes had been replaced at least once. It was projected at that time that replacement of all cyclone tubes would be mandatory within 3 to 5 years, but this anticipated wholesale replacement was delayed by a manpower-intensive program of frequent, proactive, tube replacements. This piecemeal replacement of the tubes continued through 1982; however, during this period the cyclones continued to exhibit failures that resulted in decreasing reliability, wear and tear on equipment, and labor and materials charges. The increase in unit forced outages from 1962 is shown in Figure 1. (The peak forced-outage rate experienced in 1979 was the result of a single turbine casing failure that resulted in a forced outage of approximately 1350 hours and contributed 20.5 percent to the 42.5 percent forced-outage rate for the year. Without this single event, the forced-outage rate for 1979 would have been about 22 percent—consistent with the trend at the time but still unacceptably high.)

[4] Babcock and Wilcox, Steam: Its Generation and Use, 40th edition, 1992, p. 141.



The contributions to forced outages for calendar year 1982 are analyzed in Table 4 below. These data show that cyclone failures were the principal cause of the unit's degraded performance.

Table 4

Paradise 1—1982 Forced Outage Rate (FOR) Analysis

Description	No. of Events	Forced Outage Hours	MWH Loss	Contr. To Unit FOR	Estimated Differential Power Replacement Cost
Cyclone Tube Leaks	10	882	516118	15.50	4,077,000
Waterwalls	2	158	98052	2.95	775,000
Condenser Shell	1	158	10839	0.33	86,000
Wet Coal	2	11	6881	0.21	54,000
Main Turbine Control Valve	2	5	2903	0.09	23,000
Main Turbine Shop Valve	1	2	1002	0.03	8,000
Boiler Feedpump Turbine	1	1	744	0.02	6,000
Total	19	1026	636539	19.12	5,029,000

In addition to decreasing reliability and increasing costs, cyclone repairs were becoming increasingly manpower-intensive. Although there were only ten forced-outage events attributed to cyclones during calendar year 1982, there were 213 tube leaks (and 168 leaks in 1981). Each of these leaks required maintenance attention.

As discussed above, when equipment experiences repeated failures that adversely impact performance, it is TVA's practice to undertake a structured analysis of various alternatives to correct the problem. The maintenance decision involves a choice between:

- Repair or replacement of individual components (reactive maintenance);
- Replacement of other components that have also experienced conditions that could affect future performance (proactive maintenance); and
- Incorporation of improved materials or design elements that might help address the causes of equipment degradation in the future.

TVA evaluated three primary options to address this unacceptable situation.

1. Do nothing—Make no proactive tube replacements. Take only those measures necessary to return the unit to service after cyclone tube failures.

2. Status quo—Continue with the past program of proactive replacement of damaged or high-risk tubes.

3. Replacement—Replace all cyclones in a single scheduled outage, incorporating advances in materials and design developed by BOW based on lessons learned in service.

TVA knew that there were similar cyclone problems at other utilities and that other utilities had replaced cyclones as part of their maintenance programs. The TVA analysis considered the results that had been achieved or projected by other utilities with similar large boilers. The results achieved by these utilities are shown in Table 5 below.

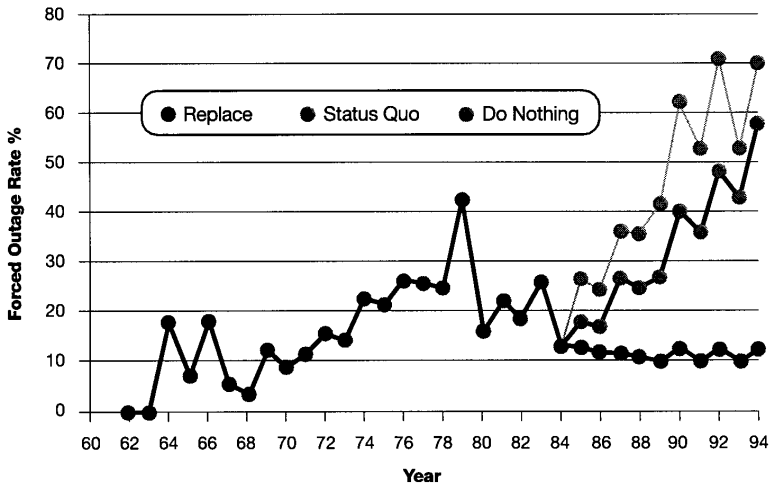
Table 5

Results of Prior Cyclone Replacements

	Unit 1	Unit 2	Unit 3
Availability Before	60%	59%	50%
1Availability After	82%	78%	75%*
FOR** Before	24.5%	29%	35%
FOR After	6.58%	13%	12%*

* Projected results—projects were being implemented at time of economic evaluation.
** FOR—Forced Outage Rate.

Based on TVA's experience to that time, complete inspection and evaluation of the condition of the cyclones, and the results of similar replacement projects performed by others, TVA projected the future performance of the unit for all three options as shown in Figure 2.



Using these projections for future performance, the expected cost of the three options, and projected differential costs for replacement power, the economic analyses Droduced the results shown in Table 6.

1Table 6

Paradise 1 Cyclone Options Economic Evaluation

	Low-Load Forecast*	High-Load Forecast*
Present Worth Savings ($ million):		
Alternative 2 vs. Alternative 1	−2.70	5.90
Alternative 3 vs. Alternative 1	15.90	45.30
Benefit/Cost Ratio:		
Alternative 2 vs. Alternative 1	0.75	1.58
Alternative 3 vs. Alternative 1	2.11	5.12

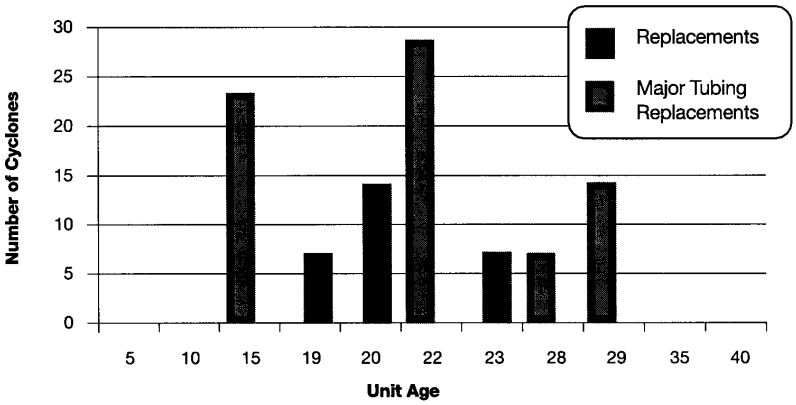
* TVA typically projects a range for future energy demands on its system: low-, medium-, and high-load forecasts. This table shows the range of cost estimates based on the low- and high-load forecasts at that time.

As Table 6 shows, Alternative 3 (full replacement during a scheduled outage) was the best alternative, maximizing both the savings and the benefit/cost ratio for both the low- and high-load forecasts. TVA chose Alternative 3 and implemented the project in 1984.

Experience on the TVA System

TVA operates six cyclone-fired units, three each at the Allen and Paradise Fossil Plants. In total, the Allen units have 21 seven-foot diameter cyclones and the Para-

dise units have 51 ten-foot diameter cyclones. All the cyclones have experienced the erosion and corrosion problems discussed above and, like Paradise Unit 1, all the originally supplied cyclones have been replaced. Figure 3 depicts the replacement history for these cyclones since 1978. The major tubing replacements refer to replacement of reentrant throat tubes at the Allen Fossil Plant. (Note that the replacements during the proactive, partial tube replacement effort are not included in Figure 3. That effort, which was performed at all TVA cyclones, is discussed above in the case study for Paradise Unit 1.)

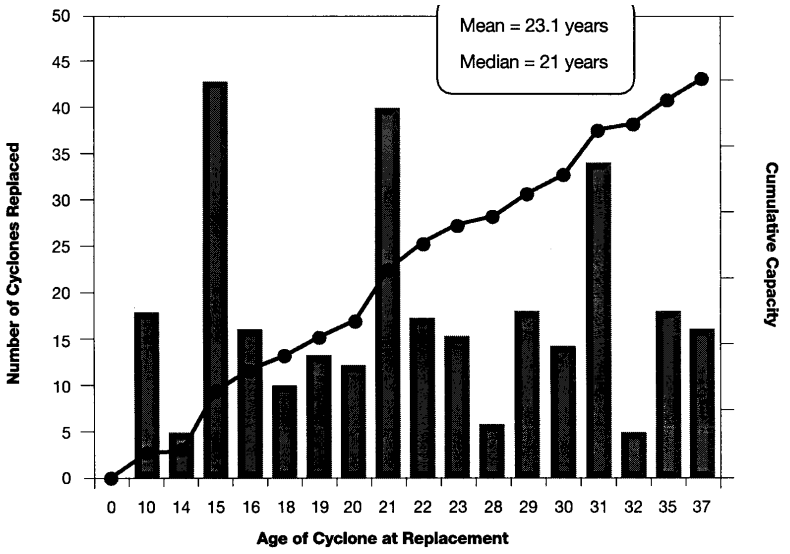


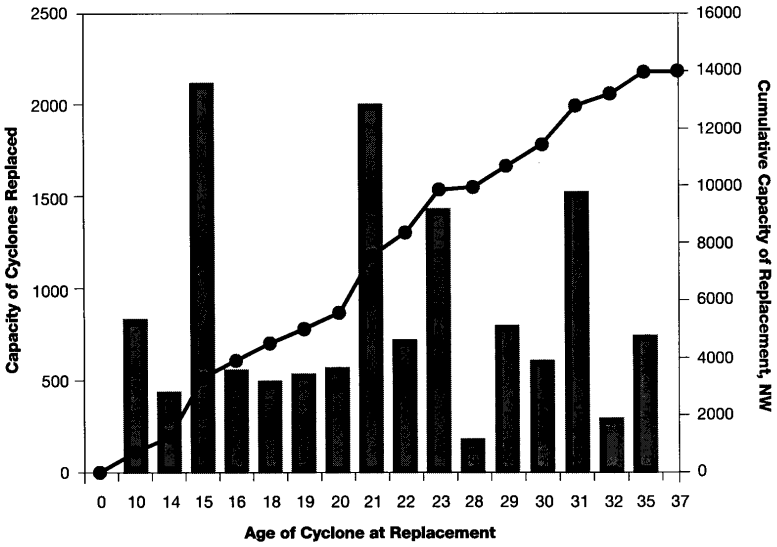
Other Industry Experience[5]

The TVA experience with operating and maintaining cyclones is not unique. Virtually all cyclone owners have encountered the same problems with varying degrees of severity. There are 96 electricity-generating stations in the United States, (totaling 26,152 MW of capacity) powered by cyclone-fired furnaces. These units contain 701 individual cyclones. At these units, 300 cyclones (representing 13,981 MW of capacity) have been replaced since 1979. Industrywide data on partial replacements were not available for this report. Figures 4 and 5 show the number of cyclones replaced and the associated capacity as a function of cyclone age. The median age of the replaced cyclones was 21 years, while the mean age of those cyclones was 23.1 years.

Of these 300 replacement cyclones, only 13 cyclones (representing a total capacity of 569 MW) were replaced with identical cyclones. All other replacements included some improvement based on the B&W rehabilitative repair and replacement strategies (discussed in the background above) or similar measures.

[5]Throughout this report, TVA experience is also included in the analysis of industry experience.





It is apparent from the TVA case study and the analysis of industrywide maintenance history and practices that full replacement of cyclones has occurred frequently throughout the industry. It is also apparent that cyclones have been replaced on units of varying ages, confirming that many variables affect the actual condition and performance of boiler components. Full replacement of cyclones to correct problems created by corrosion and erosion of materials has occurred frequently and routinely throughout the utility industry.

Balanced-Draft Conversion

Balanced-Draft Background

In the 1950's, boiler designers began to employ a new design concept for large utility boilers—pressurized furnace operation. Prior to this design, the furnaces of

all utility pulverized-coal-fired boilers had operated under a slight vacuum (negative pressure). The majority of these negative-pressure furnaces operated in a "balanced draft" mode. That is, they were equipped with a forced-draft fan that supplied the combustion air to the furnace and an induced-draft fan that mechanically drew the combustion gasses out of the furnace and expelled them through the chimney. Some smaller units were equipped with only an induced-draft fan, while some had no fans at all, using the draft effect of the chimney to draw air into the boiler and evacuate the combustion products.

There were several recognized incentives to move to pressurized firing. Operation with a negative-pressure furnace introduces some inefficiency caused by the unavoidable in-leakage of air not needed for combustion. This extra air requires additional motive power from the induced-draft fans and increases thermal losses because the total mass of hot gas lost from the system through the chimneys is increased. Keeping the furnace, the convective sections of the boiler, and the duct to the chimney under positive pressure eliminates this inefficiency. In addition, elimination of the induced-draft fan lowers the initial cost of the draft system and subsequent operation and maintenance costs.

The early installations with this forced-draft system design were initially successful and were soon followed by construction of other small, pressurized firing units. Pressurized firing was increasingly used in the industry by the mid to late 1950's and was widely accepted by the mid-1960's. (Of 284 boilers sold from 1955 to 1965 by Babcock and Wilcox and Combustion Engineering, the two largest boiler suppliers in the United States, 127 were pressurized. Of 185 sold from 1966 to 1975, 76 were pressurized.)

Although the pressurized furnaces were gaining in popularity during this period, certain shortcomings in the concept began to be manifested. Leakage of air into the furnace was replaced by leakage of combustion products out of the furnace. These combustion products, laden with fly ash and high concentrations of SO_2 and other corrosive gasses, caused several unacceptable conditions that called for a maintenance response:

- Infiltration of corrosive gasses and fly ash into the penthouses above the furnaces resulted in accelerated corrosion and structural failures.
- The employee work environment deteriorated because of exposure to high concentrations of combustion byproducts.
- Corrosion of components in the powerhouse near the boilers increased.
- Rotating machinery was exposed to increased levels of damaging particulate matter.
- Component performance was degraded because accessibility to the components was reduced, impeding performance of maintenance.

As a result, no pressurized Babcock and Wilcox units and only two pressurized Combustion Engineering units were sold after 1975 (none after 1977), and many utilities began to replace their forced-draft systems with balanced-draft systems to address equipment degradation and related health and safety problems. Some of the replacements were undertaken for economic reasons based on loss of reliability caused by component failure and inability to perform required maintenance. However, the primary reason for many of the replacements, including those on the TVA system, was improvement of the operating environment for plant personnel— employee health and safety.

The trend back to balanced-draft systems was accelerated by the addition of control equipment to meet air-quality regulatory requirements. The new control equipment added resistance (pressure drop) to the flow of the flue gas. Often, this added resistance could not be overcome by the existing draft system. Thus, when a utility considered the addition of control equipment, one of the options considered to enhance the draft system to accommodate the added pressure drop was replacement with a balanced-draft system. This was often the preferred option because it both accommodated the added pressure drop and resolved other operational, maintenance, and safety concerns, as discussed above. A TVA survey of 79 balanced-draft conversions indicates that 68 were done either out of concerns for employee health and safety or in conjunction with the addition of pollution-control equipment.

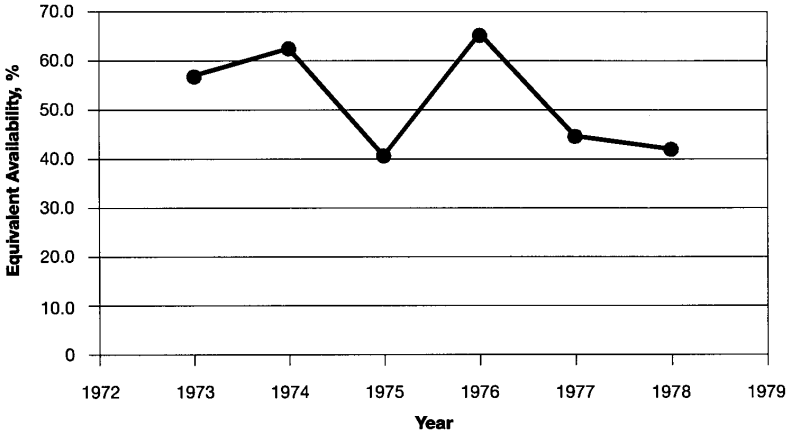
Cumberland Unit 1 Case Study

Unit 1 of the Cumberland Fossil Plant (located on the Cumberland River in Stewart County, Tennessee) is a 1300 MW (nominal) opposed-wall, pulverized-coal-fired unit that was put into service in 1973. It produces steam at 3650 psi", 10030F. The unit was not yet in service at the time Gladney and Fox reported in 1972 that the decision had been made to pressurize the penthouse on all pressurized units. This decision was made in an effort to mitigate the severe maintenance and safety prob-

lems that had been encountered on the six other TVA units that had been operating with pressurized furnaces.

Very early in the life of the Cumberland unit, it was apparent that state-of-the-art efforts to reduce gas leakage were inadequate. (These efforts included the redesign of tubing penetrations, sootblower penetration seals, expansion joints, and other design details aimed at reducing the tearing of ductwork and other pressure boundaries during boiler startups and shutdowns.) The environment inside the powerhouse when the unit was operating was intolerable—especially at upper elevations near the boiler bay. It was determined that the SO_2 concentrations inside the powerhouse exceeded the levels allowed for safe industrial occupancy.

Cumberland also was unable to consistently attain the reliability that is normally expected of a new generating unit. While this was due to a number of reasons, TVA determined that the hostile environment caused by the leakage from the pressurized furnace was a major contributor to the unit's poor initial performance, which is depicted in Figure 6.



Accordingly, TVA decided to replace the pressurized firing system with a balanced-draft system in conjunction with its decision to add new, high-efficiency electrostatic precipitators to the unit for particulate control. In this instance, a rigorous economic evaluation justifying the decision was not made; providing a safer work environment for employees was deemed a major priority. The authorization document for the conversion states:

. . . (G)as leakage from the boilers has resulted in sulfur dioxide and fly ash problems in the plant. Sulfur dioxide concentrations exceed the recognized national standard established to limit employee exposure and also prohibit adequate equipment maintenance and increase unit deratings. Also, the entrained fly ash infiltrates plant equipment, resulting in premature failures and further deratings. The addition of induced-draft fans and conversion to balanced-draft firing will eliminate these problems.

. . . The addition of induced-draft fans and conversion to balanced-draft firing will bring the two Cumberland units into compliance with TVA Code VIII HAZARD CONTROL and consistent with the Occupational Safety and Health Act of 1970. The cost of converting these units to balanced-draft is estimated to be $41 million; this cost will be partially offset by the potential saving of reduced deratings and unit trips and by reduced plant maintenance.[6]

The project was approved in 1978 and implemented in 1981.

Experience on the TVA System

Eleven of TVA's 59 operating units, totaling over 7,100 MW, were initially constructed and operated with pressurized furnaces. This included all units that went into service between 1962 and 1973. Today only one of these units, the 900 MW Bull Run unit, remains in pressurized operation.

Bull Run is unique among the TVA pressurized units in that it has historically burned coal with a much lower sulfur concentration. (The lower sulfur content re-

[6] Tennesssee Valley Authority Project Authorization, Serial No. 3384, September 29, 1978.

duces the corrosiveness and SO_2 concentration of gasses that may leak into the powerhouse.) Bull Run has experienced many of the adverse conditions associated with pressurized firing. However, the twin-furnace, membrane-wall construction of the unit combined with its continuous operation as a base-load unit burning low-sulfur coal has allowed plant staff to maintain a safe working environment while balancing the impact of reduced reliability and other economic penalties associated with pressurized units. The penthouse at Bull Run was pressurized in 1972.

Similar to the Cumberland project, other forced-draft system replacement projects on the TVA system were performed in conjunction with addition of environmental control equipment. Table 7 summarizes the history of TVA balanced-draft conversions.

Table 7

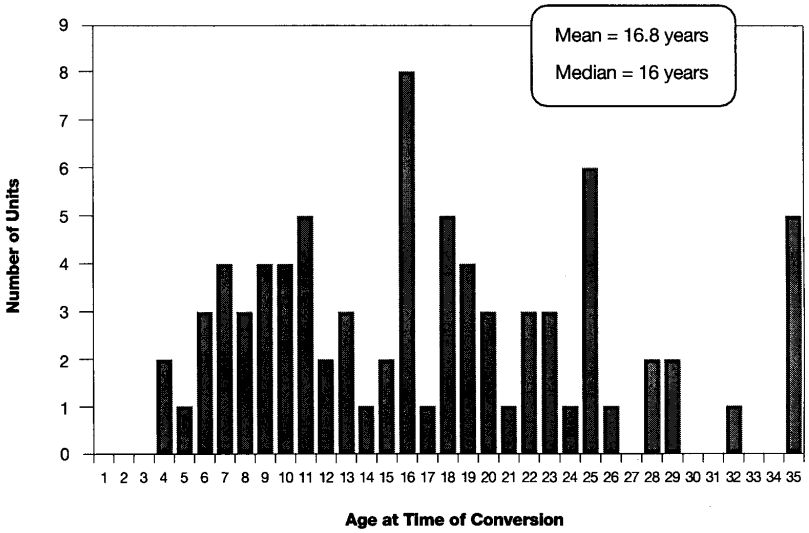
Draft System Replacements of JVA Coal-Fired Units

Unit	Size, MW	Date of Initial Operation	Date of Draft System Replacement	Concurrent Environmental Control
Allen 1	330	1959	1991	None
Allen 2	330	1959	1993	None
Allen 3	330	1959	1993	None
Colbert 5	500	1965	1981	None
Cumberland 1	1300	1973	1981	ESP
Cumberland 2	1300	1973	1982	ESP
Paradise 1	700	1963	1983	FGD
Paradise 2	700	1963	1983	FGD
Paradise 3	1150	1970	1983	ESP*
Widow's Creek 8	500	1965	1977	FGD

* Paradise 3 replacement of forced draft system was delayed one outage cycle by delays in delivery of induced draft fans.

Other Industry Experience

There are no readily accessible data that identify industrywide pressurized furnaces and those where a forced-draft system was replaced with a balanced-draft system. However, TVA was able to obtain data from a large sample of U.S. utilities that own a significant number of coal-fired generators. This data set includes 19 utilities that operate 166,000 MW of fossil generation. These utilities collectively own 151 boilers that were purchased and initially operated with pressurized furnaces. Within a 15-year period beginning in 1972, utilities replaced forced-draft systems with balanced-draft systems on 73 of these units. (Six other units were converted between 1991 and 1995 for a total of 79 conversions representing 52 percent of the sample population.) Draft system replacement did not alter these unite' treat input capacity or steam flow but in most instances reduced the net electrical output because of increased auxiliary electrical loads for the induced-draft fans. The ages of the units at the time of the conversions are shown in Figure 7.



These data show that replacement of forced-draft systems with balanced-draft systems in order to address equipment degradation, maintenance problems, health and safety concerns, and pollution control requirements has occurred frequently in the utility industry. The data show that these draft system replacements occurred regardless of the age of the unit, with age at conversion ranging from 4 to 36 years. On the TVA system, conversions to balanced-draft were justified primarily because of the need to improve working environments for employees. Improvement in unit reliability was an important collateral benefit. Balanced-draft conversions have occurred frequently and routinely in the utility industry.

Reheater Replacement

Reheater Background

Modern coal-fired power plants operate on cycles based on the regenerative Rankine cycle. In this cycle the boiler feedwater is converted to superheated steam in the boiler and used to drive a turbine-generator for electrical energy production. The steam is then condensed to liquid water to allow it to be pumped back to the boiler. The water is then heated using heat exchangers and returned to the boiler again as the boiler feedwater (thus being a regenerative cycle). In efforts to increase the plant thermal efficiencies (that is, reduce the amount of coal required to be burned for a specified output of electric power), the cycle was first improved to use superheated steam and then further improved with the addition of the reheat circuit. This latter addition, referred to as the reheat cycle, includes removing energy from the superheated steam in a high-pressure turbine and then returning the steam to the reheat section of the steam generator for additional heat energy. The steam is then again returned to the turbine-generator for further energy removal. For large installations, reheat makes possible a thermal efficiency improvement of approximately 5 percent and substantially reduces the heat rejected to the condenser cooling water.[7]

Most of the TVA coal-fired plants built since 1951 (all since 1954) use the reheat cycle. The portion of the steam generator that transfers the heat to the steam is referred to as the "reheater" or the "reheat superheater." This system is, in general terms, a simple single-phase heat exchanger with steam flowing on the inside and the flue gas passing on the outside, generally in a cross-flow configuration.[8] The major components are:

- Inlet header (which distributes steam returning to the boiler from the high-pressure turbine exhaust to the individual tubes)
- Heat exchange tubes or elements (horizontal, pendant, platen, terminal, or crossover depending on individual design)

[7] Combustion Engineering Inc. Combustion Fossil Power, 4th edition, 1991, pp. 1–8.
[8] Babcock and Wilcox, Steam: Its Generation and Use, 40th edition, 1992, pp. 1–8

- Outlet header (which collects heated steam from the individual tubes for passage to the intermediate-pressure turbine)

Because of the high operating temperatures, appropriate construction materials are critical to a successful reheater design. Accordingly, steel alloys were used in parts of the reheater construction because of their superior high-temperature properties and resistance to oxidation. But, as in all components of these steam generators, portions not operating at high temperatures were constructed of lower alloy steels (also referred to as higher carbon steels) that were lower in cost. The design of the reheater components, as other boiler components, was an attempt to optimize between the initial cost of materials of construction and the need for higher-cost steel alloys for reliable operation.

As a result, carbon and low-alloy steels were used for portions of the reheater subject to lower temperature ranges, such as the reheater inlet tubes (where the lower temperature steam from the high-pressure turbine exhaust enters the reheater). Intermediate chrome-molybdenum (Cr-Mo) steels were used for portions subject to higher temperatures, such as toward the reheater outlet (where the steam achieves its maximum temperature). Unfortunately, this use of differing materials added an unforeseen failure mechanism to these components—the difficulties of welding dissimilar metals together.

In early reheater designs, the materials selected were not always adequate to address the full range of the conditions that would be experienced, such as varying temperatures during operational upsets, varying physical and thermal stresses, water chemistry conditions, and changes in coal and ash physical and chemical properties. Accordingly, the useful life of these reheaters varied significantly among the many units in the industry because of the differences in operating environments.

In addition to construction materials, the physical design of the reheaters was critical to the actual performance of the components in service. Again, an optimization was required to balance the desired high heat transfer from the gas to steam and the need to avoid undesirably high metal temperatures. Another major factor was the optimization of available tube surface while maintaining adequate tube spacing to avoid high gas velocities and the resulting excessive erosion of the tube material.

Combined with these design considerations were the coal-ash properties that must be factored into the design in order to avoid fouling and, again, excessive erosion. To manage the fouling conditions, sootblowers were added in some applications. As with the welding of dissimilar metals, installation of sootblowers to reheaters adds a potential failure mechanism to reheater components, namely, erosion caused by sootblower impingement.

Design features similar to those described above are extremely important in determining the life of reheater components. Equally important however is the actual operating environment to which the reheater is subjected. This can probably be best illustrated by examining the most common tube-failure mechanisms experienced in reheaters and the corresponding potential root causes as identified in the Electric Power Research Institute's Boiler Tube Failures: Theory and Practice.[9] See Table 8 which follows.

Table 8

Failure Mechanisms in Reheaters (RH)

Failure Mechanism	Possible Root Causes
Short-Term Overheating in RH Tubing.	• Tube blockage induced (especially exfoliated oxide blockage) • Maintenance induced (improper chemical cleaning or repairs) • Operation induced (improper startup or shutdown, or overtiring with top heater out of service)
Long-Term Overheating/ Creep.	• Influences of initial design and/or material choice • Buildup of internal oxide scale • Overheating due to restricted flow caused by chemical or other deposits, scale, debris, etc. • Operating conditions or changes in operation • Blockage or laning of boiler gas passages • Increases in stress due to wall thinning

[9] Electric Popover Research Institute, Boiler Tube Failures Theory and Practice, TR-J05261.

Table 8—Continued

Failure Mechanisms in Reheaters (RH)

Failure Mechanism	Possible Root Causes
RH Fireside Corrosion (Sootblower or Ash).	• Influence of overheating of tubes (poor initial design, internal oxide growth during operation, high temperature laning, tube misalignment, operational problems when coal is changed, and rapid startups causing reheater to reach temperature before full steam flow) • Change to coal with unusually corrosive ash • Incomplete or delayed combustion
Dissimilar Metal Weld Failures (Failures occur where ferritic and austenitic steels are welded together).	• Excessive tube stresses such as caused by improper initial design or improper tube supports • Excessive local tube temperatures • Change in unit operation (increased unit cycling, change of fuel, redesign of adjacent heat duties) • Initial fabrication defects
Stress Corrosion Cracking.	• Influence of environment (mainly contamination from carryover of chlorides from chemical cleaning of waterwalls, boiler water carryover, caustic from attemperator spray, condenser cooling water leaks, or ingress of fireside contaminants or flue gas during primary leaks) • Influence of excessive stresses (especially at supports) • Need to change material to a stabilized grade of stainless steel

These failure mechanisms can occur concurrently or individually. Depending upon the failure mechanisms, different maintenance responses may be required. These range from repair or replacement of individual tubes or tube sections, to redesign and replacement of the reheater, to the installation of equipment that will address the root cause of the maintenance problem (such as sootblowers).

Cumberland Units 1 and 2 Reheater Replacement Case Study

In addition to the Cumberland Unit 1 features described earlier, Cumberland Units 1 and 2 each had 233,200 square feet of reheater surface installed as part of the original construction. During operation of the plant, high wear rates caused by fly ash or sootblower impingement resulted in numerous erosion shields being added and subsequently replaced. Cracks were routinely identified during inspections and were ground out and repaired. Individual tubes were cut out and replaced because of thinning from high-temperature oxidation and coal ash corrosion, mechanical damage, sootblower erosion, or overheating damage. Misaligned tube elements were realigned and numerous support lugs replaced. Still, the reheater condition continued to degrade and require increasing maintenance attention.

In the 1986–1988 period, deterioration of the inlet pendant lower loops led to their being cut out and replaced with SA213-T22 material, a higher chromium content steel that is more resistant to loss of strength with long-term exposure to high temperature. However, the T22 material is susceptible to out-of-service pitting. As a result, these loops were replaced again in 1996.

In 1996, TVA conducted a comprehensive review of the failure experiences in the Cumberland reheaters. The review showed that during the period of fiscal years 1992–1996, 11 leaks had occurred in the Unit 2 reheater pendant tubes. A root cause analysis was performed on the 11 leaks, and several failure mechanisms were identified (including corrosion fatigue, stress corrosion cracking, weld defects, high-temperature oxidation/coal ash corrosion, dissimilar metal welds, and sootblower erosion) with several root causes. Inspections and nondestructive testing indicated that further failures were developing. It was projected that the failure rate would increase and further jeopardize the availability of the unit, potentially causing two forced outages per year by the year 2000.

TVA concluded that, because of the damage that already existed and the overall condition of the existing reheat pendant tubes, the most economical solution was the complete replacement of the 147 inlet and outlet elements. The following items were also recommended:

- Changes in the design of the structural attachments that were welded to the tubes. These attachments were limiting thermal expansions, thereby creating high local stresses that were leading to corrosion fatigue failures. The supports were redesigned and materials changed to reduce or eliminate this mechanism.
- Improvement in the unit's boiler water chemistry program. Condenser tubes were replaced to stop leakage of contaminants from the untreated condenser cooling water into the feedwater system. Also, the feedwater chemistry treatment process was changed to reduce or eliminate water chemistry contributions to the conditions that led to reheater internal tube corrosion.

- Improvement in the welding quality assurance program. Failures had been occurring in field welds and header socket welds. A new welding quality assurance program was implemented to avoid repeats of these failures.

The cost of the element replacement project was estimated to be $8.4 million, with a projected benefit of $2.9 million per year. Thus the project would pay for itself in 3 years. The recommendations were implemented and the reheater was replaced in 1999.

Experience on the TVA System

Of TVA's currently operating 59 units, 49 use the reheat cycle. In all these units, partial or complete replacement of the components of the reheaters exposed to the flue gas stream has been required in order to keep the units in reliable operation.

Some plants have had different life experiences of the inlet versus the outlet reheater pendants. For example, TVA had to replace the outlet pendant elements at Gallatin Fossil Plant Units 1 and 2 within 8 to 15 years, while the inlet pendant elements operated for more than 35 years without replacement. Figure 8 below provides a summary of the reheater modification/replacement projects performed on the TVA system. At least one significant portion of the reheater pendant elements in every TVA reheat cycle unit has had to be replaced within 20 to 40 years of initial operation.

Other Industry Experience

To assess industry practice in the maintenance of reheaters, TVA analyzed data from other utilities with predominately coal-fired generation. These data represent the maintenance histories of 219 generating units totaling more than 80,000 MW of electrical generation. Of these 219 units, 190 are equipped with reheaters. The results of this analysis are given in Figure 9.

Of the 190 reheaters included in the sample, there have been 231 reheater replacement projects, with some reheaters having been replaced more than once. As with the cyclone and the draft system replacement data, these data show no strong correlation between reheater replacement projects and reheater age. Ages at replacement ranged from 5 to 44 years, with a mean age of 25.1 years and a median age of 25 for this data set. This leads to the conclusion that factors other than age determine the need for reheater replacement.

Economizer Component Replacement

Economizer Background

Another enhancement to improve the efficiency of the base Rankine thermal cycle was the addition of a heat exchanger in the flue gas stream exiting the steam generator. This heat exchanger, called an economizer, is typically a simple single-phase, tubular heat exchanger with boiler feedwater flowing on the inside and flue gas passing on the outside of the tubes. Thermal energy in the flue gas is transferred across the heat exchange surface into the feedwater, increasing its temperature before it enters the unit's steam drum or the furnace surfaces, depending upon the boiler design.

The economizer provides another useful function by reducing the magnitude of thermal shock caused by feedwater temperature fluctuations at the inlet to either the boiler drum or the waterwalls. Thermal shock, the rapid change in metal temperature due to changes in the fluid temperature, produces stress increases in thick walled boiler components. Large numbers of these stress cycles will ultimately lead to failure of the component.

The economizer is usually the last heating surface in the flue gas stream before the gas stream exits the steam generator and passes through the combustion air preheater. The overall efficiency of a boiler is improved more by using the thermal energy in the flue gas to heat feedwaterthan by using it to preheat the combustion air. Sizing an economizer, that is, determining the amount of heat transfer surface to be provided, is an economic optimization among three principal parameters: the cost of the economizer surface, the cost of the air preheater, and the thermal efficiency of the boiler.

The major components of the economizer, in general terms, are the inlet header, the heat exchange tubes or elements, and the outlet header. Since these components are exposed to considerably lower temperatures and a less hostile environment than other boiler components (reheaters and superheaters, for example) they are typically constructed from low-carbon steel to reduce cost. However, because this steel is subject to corrosion in the presence of even extremely low concentrations of oxygen, it

is necessary to provide boiler water that is practically 100 percent oxygen-free.[11] This tubing is also susceptible to fly ash erosion and erosion/corrosion.

Thus, as with the reheater, both the physical design and fabrication details of the economizer and the operating conditions it encounters are important factors that determine its useful life. Their importance is again clearly illustrated by the summary of the most common tube-failure mechanisms experienced in economizers and the corresponding potential root causes taken from the Electric Power Research Institute's Boiler Tube Failures: Theory and Practice.[12]

Table 9

Failure Mechanisms in Economizers

Failure Mechanism	Possible Root Causes
Corrosion Fatigue	• Influences of excessive stresses/strains (especially restraint stresses at attachments) • Influence of environmental factors (poor boiler water chemistry, overly aggressive or improper chemical cleaning, and/or improper boiler shutdown and/or lay-up procedures) • Influence of historical unit operation (operating procedures that have caused high stresses)
Fly ash or Sootblower Erosion.	• Excessive local velocities (geometry of design, distortion or misalignment of tubing rows, misalignment or loss of gas flow guides and baffles, operating above the continuous design rating, and/or operating above design excess air flow) • Increased particle loading (fuel considerations and/or soot-blower operation or maintenance) • Improper sootblower operation (control of frequency, temperatures, pressures, and travel; mechanical malfunctions, etc.)
Thermal fatigue of economizer inlet header tubes.	• Operating conditions that produce large through-wall thermal gradients in the header • Header design and construction
Erosion/corrosion in economizer inlet headers.	• Very low O2 levels and high levels of oxygen scavenger
Low-temperature creep cracking.	• High stresses (high residual stresses from the cold forming process, enhanced membrane stresses caused by tube ovality, and/or high service stresses)
Fatigue in tubes	• Excessive strains caused by constraint of thermal expansion • Excessive mechanical stresses (poor design or manufacturing) • Vibration induced by flue gas • Poor welding
Pitting in tubes	• Influence of improper shutdown practice (presence of stagnant oxygenated water) • Sagging economizer tubes preventing tube draining after shutdown (presence of stagnant oxygenated water)
Acid dew point corrosion	• Operation of economizer below the acid dew point (SO_2 oxidizes to SO_3 and combines with moisture to form sulfuric acid)

Paradise Unit 3 Economizer Replacement Case Study

Unit 3 of the Paradise Fossil Plant (located on the Green River in Muhlenberg County, Kentucky) is a 1,100 MW (nominal) cyclone-fired unit that were put into service in 1970. It produces steam at 3650 psi'', 10030F.

The unit has 281,580 square feet of economizer surface, which was installed as part of the original B&W design and installation. During the first 20 years of unit operation, the reliability of the economizer began to decrease as a result of many of the failure mechanisms addressed in the background discussion. A 1992 review of the generating unit's performance reliability found that tube failures in the economizer was one of the leading causes of forced outages.

A root-cause analysis investigation found numerous failure mechanisms and root causes contributing to these leaks. The predominant failure mechanisms were identified as fly ash erosion, corrosion fatigue, pitting in tubes, and thermal fatigue of economizer inlet header tubes. The root causes were determined to be the following:

- Poor original design of the economizer (including the baffles).
- Inadequate boiler water treatment and boiler water chemistry control.
- Startup procedures that were allowing slugs of cold water to enter the economizer inlet header.
- Cycling stresses due to forced outages on the unit from other causes.

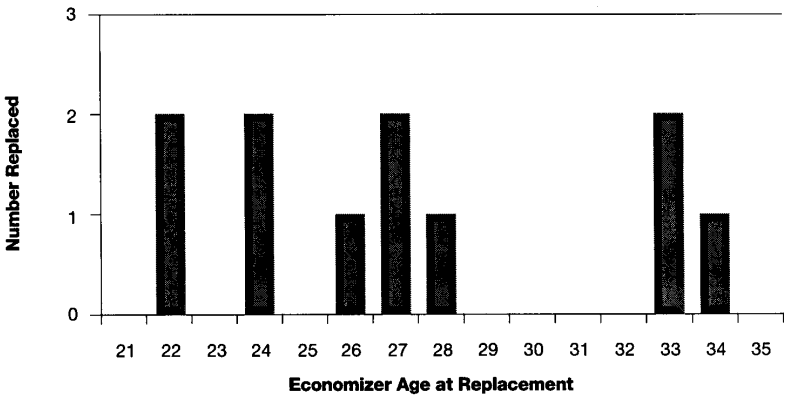
[11] Combustion Engineering Inc., Combustion Fossil Power, 4th edition 1991, pp 5–10.

[12] Electric Power Research Institute, Boiler-Tube Failures: Theory and Practice, TR–105261 Volume 2: Water-Tooched Tubes, 1996.

Measures were implemented to eliminate these root causes or reduce their future impacts. However, past operations had already significantly damaged the economizer elements and inlet header. It was projected that without replacement of most of its components the economizer would increasingly contribute to unit unreliability. It was determined that component failures would, in fact, increase the economizer contribution to unit downtime by approximately 10 percent per year. This equated to a differential cost of replacement power to TVA of $19,543,000 plus the cost of repairs for the fiscal years 1995–1999 period. The total cost to replace the economizer was estimated to be $9,153,000. It was replaced in 1994.

Experience on the TVA System

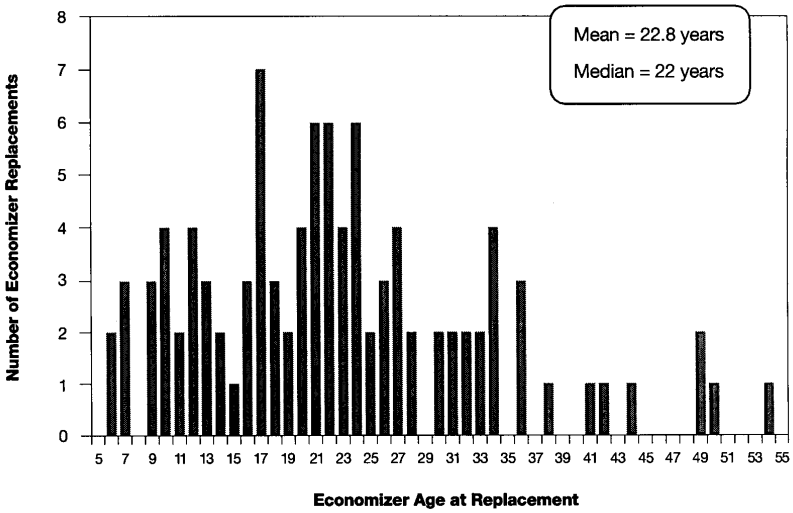
Of TVA's currently operating 59 units, 44 are equipped with economizers. TVA has replaced all or a significant portion of the economizer elements/tubes on 11 units and has replaced the inlet headers on 3 units. Because of the relatively less severe service conditions of economizers, they have generally experienced longer useful lives than other boiler components discussed above. The TVA history of economizer component replacement projects is provided in Figure 10 below.



Other Industry Experience

The age analysis of economizer replacement projects for the same industry sample used in the reheater analysis above is presented in Figure 11. Of the 219 units in the sample, 202 are equipped with economizers.

As might be expected, because of the generally less severe service conditions, there have been fewer economizer replacement projects than reheater replacement projects: 98 economizer projects versus 231 reheater projects. However, the average and median ages of the affected economizer at the time of the replacement project are less than the average and median ages of the reheater replacements by 2.3 and 3 years, respectively. The age distribution of the economizer replacements is similar to the reheater age distribution. There is no strong correlation between economizer age and economizer replacement. It is apparent that factors other than age create the situations that lead to economizer replacement.



Conclusions

The Tennessee Valley Authority has, in its more than 65 years of operating electricity-generating plants, established a philosophy of maintenance that has as its objective the safe, reliable, low-cost supply of electricity to the residents of the Tennessee Valley. This maintenance philosophy has been in place and implemented consistently since long before 1972, as is evidenced by the 1972 Gladney-Fox report referenced previously.

At the core of TVA's philosophy is a thorough evaluation of factors that contribute to loss of reliability and consideration of alternatives to mitigate the loss. The selection of the appropriate alternative is most often based on economic considerations. The selection is also heavily influenced by other factors that are important to TVA, such as employee health and safety. It is common for the selected alternative to be replacement of equipment or components—often with functionally identical equipment or components that reflect improvements in technology and lessons learned from actual service. The many factors that influence equipment or component replacement include design or fabrication errors, unanticipated operating conditions, operational errors, and technology advancements.

Analysis of selected TVA projects that involved replacement of components and systems at TVA generating units does not reveal any strong correlation between the need for replacement and age of the equipment or component. TVA is no different from other electric utilities in its maintenance practices. Others in the industry routinely perform the projects performed by TVA. Furthermore, analysis of data from a large sampling of other utility projects clearly indicates that this routine maintenance behavior—component and equipment replacement—is driven by factors other than unit or component age.

Biographical Notes

Jerry L. Golden is the Senior Manager of Production Technology in the Tennessee Valley Authority's Fossil Power Group. At various times he has served as TVA's Head Mechanical Engineer, Fossil Steam Generation and Equipment; Manager, Advanced Production and Environmental Technology; Manager, Clean Air Program and Generation Technology; Manager, Fossil Engineering; and (Acting) Vice President, Governmental Relations.

Mr. Golden served on the U.S. Environmental Protection Agency's Acid Rain Advisory Committee and chaired the Base Programs Analysis and Policies Work Group of EPA's Clean Air Act Advisory Committee. He currently serves as utility chair of the EPRI advisory committee dealing with post-combustion NOx control and is an advisor on the EPRI boiler performance and SO_2 committees. He also serves on the board of directors of the UtiliTree Carbon Company, an entity formed to implement carbon reduction and sequestration activities for utilities participating in the Climate Challenge Program of the U.S. Department of Energy.

Mr. BYNUM. Mr. Chairman, TVA finds itself in the position of agreeing with what appears to be the EPA's broader goals in these NSR changes improving the nation's air quality. However, we remain concerned that the agency may be tempted to shoehorn this admirable goal into a program that's primarily designed to address the permitting and control of new sources. Literally, the New Source Review Program is about who turns the wrench, when, and where. It is not intrinsically designed to handle broad shifts in air quality policy.

In the Summer of 1998 TVA announced a voluntary installation of selective catalytic reduction controls to control of nitrogen oxide emissions at ten of our larger coal plants. TVA has undertaken this effort because we believe it is necessary if air quality improvements are to continue in the Tennessee Valley region. We have committed to this effort although it will cost more than $500 million on top of the more than $2.5 billion that TVA has already spent to reduce emissions from it coal-firing plants.

I note this voluntary effort for two reasons. First, I think it demonstrates our commitment to environmental stewardship. Second, it represents an emission control effort based on a comprehensive analysis of our entire system to achieve improved air quality throughout the Tennessee Valley and adjacent areas. TVA carefully considered the air quality challenges facing our region and we're placing SCR controls where they will do the most good. When considering how air quality should be improved, an approached similar to TVA's system-wide plan for nitrogen oxide reductions can be a template. Although, the utility industry has just finished substantially reducing its NOx emission, the TVA thinks more can and should be done. What is needed is a program that allows utilities to reduce emissions on the system-wide or industry-wide basis over time while still allowing units to be maintained as they have been historically. Unfortunately, the attempts to achieve this goal through the New Source Review Program likely will fall flat. The underlying program is ill-equipped to answer these far reaching policy considerations. TVA stands ready to work with this subcommittee and EPA to continue the improvements in air quality and to develop the requirements for a successful program.

Mr. Chairman, the subcommittee's interest in the proposed changes to the New Source Review Program is well timed. We are in an important juncture in trying to find a way to continue improvements in air quality without sacrificing the maintenance of individual facilities or the reliability of the overall collective system. Thank you.

Senator INHOFE. Thank you, Mr. Bynum. As the only Federal agency who must live under the NSR regulations, your testimony is very important to us. You have both the credibility, if you want to call it that, of a Federal agency and the real-world experience of a private sector or a regulated industry.

Mr. BYNUM. Yes, sir.

Senator INHOFE. On the average how long does it take to apply for and receive a permit under the NSR program?

Mr. BYNUM. I think the 12 months that have been mentioned is probably a realistic average for permits.

Senator INHOFE. So you agree with Mr. Seitz in that?

Mr. BYNUM. I do. I think that's about average. I think the difficulty with the timeframe, however, is if you look at some of the activities that we're concerned about being contemplated is you don't always have a 12-month lead time to know when you're going to have to do some of those activities. For instance, just 2 days ago we removed a rotor from one of our fossil plants that was, in fact, running just fine a week ago. Now we're contemplating doing work on that rotor and replacing that rotor and we can have that done in a relatively short period of time. And we would be severely restrained if we had to go through a 12-month permitting process to do that type of a replacement. So it's not only the timing. I wish I had a year to know every replacement, every major piece of maintenance that I had to do. I wished I had a year's advance to know what I was going to have to do.

Senator INHOFE. As a Federal agency, do you think you were treated the same as other facilities?

Mr. BYNUM. Yes, I do.

Senator INHOFE. Could you explain what effect the NSR program has on your reliability and also the effect on your rate payers?

Mr. BYNUM. Well, clearly, you know, we have to be able to maintain the reliability of our fossil plants. You know, we had understood and hope will continue the new source review, you know, should not be aimed at not allowing us to do those projects that improve efficiency, improve reliability of the system. We absolutely have to maintain that reliability. This past year we broke our previously all-time record system usage 16 times in a 30-day period. So the demand is continually growing, which means the reliability of our fossil plants continually has to increase.

So in the case you were talking about with Mr. Seitz, the number of hours those units are going to run is expected to increase. It has to increase because of the increase in demand that we have on our system. So it's extremely important.

From our standpoint, we don't have stockholders. The rate payers in our communities pay for all of the modifications, pay for all of the—if a unit is not available, we have to go out on the market——

Senator INHOFE. You never hear from them, of course?

Mr. BYNUM. Of course. We have quite a vocal rate paying community, I can assure you.

Senator INHOFE. Senator Voinovich?

Senator VOINOVICH. Earlier today I was talking to someone and trying to get an understanding of what we're talking about here. And there is some understanding that when the Clean Air Act went into effect that we grandfathered in the pollution that was already being generated at the time, and that nothing has been done since that time to modify the facilities over that period.

I'd like you to comment about even though some of the old facilities have been grandfathered, are they still spewing out the same emissions that were there when they were originally grandfathered? I would like you to comment on that.

Mr. BYNUM. Absolutely not. In fact, that is a common misperception. As was discussed before, there are national ambient air quality standards, and we have to meet those national ambient air quality standards and those are met with modifications and

met by the existing power plants that we have that have been so-called grandfathered.

The Clean Air Act of 1990 which, through the acid rain portion, required additional reductions. Those were done with these fossil plants. Literally every plant in our system has had to do some type of change as far as scrubbers—all the way from scrubbers on some units down to fuel switches. But they all have been required to change some mode of operation in order to meet the new—not only the national air ambient quality standards but the acid rain legislation that was placed on top of that. So these facilities have not been exempt from that. In fact, these are the facilities that we have made the adjustments to that have been able to meet those requirements. We've reduced our SO_2 by—or will have reduced it by 80 percent. By 2005 we will have reduced our NOx by 70 to 75 percent in the same timeframe on these units.

Senator VOINOVICH. I appreciate your clarifying that, because there is that perception among some of the public that this is the way it is. I know in our State utilities have spent an enormous amount of money reducing the emissions going into the air. As a matter of fact, when I looked the last time at some statistics, that we had spent more in Ohio on dealing with that problem than many of the utilities in the States that were complaining about the loading of ozone going into their respective States.

One of the things that I'm concerned about, the WEPCO decision came in and basically said if you make a major modification you've got to get the permit. But they also said that miner modifications were not subject.

Do you think that the rules that are being written today are aimed at changing the WEPCO decision through regulation and applying a new standard?

Mr. BYNUM. I have a concern that they are. And, again, if you look at the—you know, the exclusion is for routine maintenance. And what's routine maintenance and the types of things that I'm talking about, boiler tube repairs, replacements, certain boiler sections, reheater replacements, major turbine work. I mentioned the turbine rotor, other turbine type work. This work has been routinely done in our industry for years, before the WEPCO ruling. In fact, I have a—I indicated the one paper that we had on routine maintenance. I have another which was, in fact, written in 1972 that describes the typical maintenance that's required to maintain the reliability and availability of fossil power plants. Those things have not changed. They are the same things that were good basic maintenance practices to improve the reliability and efficiency of plants in 1972 are the same things that we're talking about today, that we are concerned could be put in a rule that would prohibit us from doing this or that would require repermitting and then the putting on of controls subsequent to that. So that is our concern.

Senator VOINOVICH. One other comment, Representative Strickland mentioned the statement of J.J. Berry, the International President of the International Brotherhood of Electrical Workers. And he raised some questions about safety and the welfare of utility workers. Would you like to comment on that?

Mr. BYNUM. Well, I share this concern. Anything that would tend to threaten the reliability of pieces of equipment in a fossil plant

where you might have a failure of a piece of equipment could certainly be not only an issue of reliability but safety for our employees. We're talking about conditions—4,000 pounds of pressure in some of these boiler tubes, that's a two-and-a-half mile depth in the sea, 3,000 degree Fahrenheit, 24,000 volts in our generators. So we're in, you know, a relatively hostile environment. And anything that degrades the reliability of equipment in that environment, you know, certainly would be an issue with public health and the safety of our employees.

We have done projects in the past. For instance, we did a balance draft conversion on a number of our units, and that was largely driven by the atmosphere that was created in the upper sections of our power plants. And now, you know, we would be afraid that those types of projects through some new rule would be prohibited or at least require you to go back through the permitting process. And we think that would be very detrimental to us being able to conscientiously go forth with our responsibilities for employee health and safety.

Senator VOINOVICH. Thank you.

Senator INHOFE. Thank you, Mr. Bynum.

I'd now ask that our fourth panel come to the witness table. Panel 4 includes Mr. Bob Slaughter, Director of Public Policy for the National Petrochemical and Refiners Association; Mr. W. Henson Moore, an old friend of mine from the House of Representatives days and now the President and Chief Executive Officer of the American Forest and Paper Association; Mr. David Hawkins, of the Natural Resources Defense Council; and Mr. Bill Tyndall, who's been back with us several times before and used to be with one of my closest friends in the House John Dingle, now Vice President of Environmental Services of Cinergy Corporation.

With that said, we'll start in the order that the panelists appear on the agenda.

Mr. Slaughter?

STATEMENT OF BOB SLAUGHTER, DIRECTOR, PUBLIC POLICY NATIONAL PETROCHEMICAL AND REFINERS ASSOCIATION

Mr. SLAUGHTER. Good afternoon, Mr. Chairman, and Senator Voinovich. My name is Bob Slaughter. I am general counsel and director of public policy for the NPRA, the National Petrochemical and Refiners Association. I am here today to present joint testimony on behalf of both NPRA and the American Petroleum Institute. Together those associations represents essentially all petrochemical and petroleum refiners for whom NSR reform is a very critical issue.

My message today is a simple one. New Source Review reform is needed to allow refiners to continue their record of achieving significant environmental progress. And almost as we speak the EPA is in the process of issuing far reaching new environmental regulations which necessitate further changes in refinery facilities and operations.

The current EPA interpretation of NSR threatens to frustrate our efforts at compliance with these new initiatives. Even worse, certain EPA activities indicate that some agency officials may even be seeking to second guess past actions which were taken in good

faith and in reliance upon NSR interpretations, which we believe to be both firmly established and long settled. This amounts to changing an existing regulation without public notice and comment or congressional review.

Clearly NSR reform is needed to remove the cloud of uncertainty over the current and future operations of refiners and other key industries. We hope that this hearing will help lead to effective NSR reform.

Refineries have an impressive record of emission reduction. As shown on the first chart, EPA figures demonstrate that we have reduced our emissions by 74 percent between 1980 and 1996. Refining capacity declined only 16 percent during the same period. Since then we have made further progress both in reducing emissions from refineries and in cutting emissions from our products, such as through the reformulated gasoline program.

We are being asked to do much more. The second chart is what we call our regulatory blizzard chart. It lists recent anticipated environmental initiatives, 13 of them, with which the refining industry must comply in the immediate and near future. We will spend billions of dollars to meet these requirements. Most, if not all, will require changes in facilities or procedures. For example, the final Tier II gasoline sulfur rule will require roughly $8 billion of industry investment in a short timeframe to accomplish what EPA estimates is the environmental equivalent of removing 164 million cars from the road.

The upcoming diesel sulfur regulation will cost roughly an additional $4 billion and must be implemented over nearly the same time period as gasoline sulfur reduction. Current NSR interpretation will impede our efforts to comply with these new environmental requirements. Although intended to limit emission increases, New Source Review now applies to actions which do not increase or which may even reduce emissions. Traditional tests to determine NSR application are now structured to require NSR in most instances.

Former exceptions to NSR application have been narrowly construed or recast so that they provide little or no relief. At best current NSR policy is hopelessly confusing. At worst it can be paralyzing. When triggered, NSR is an onerous and time consuming process. Despite the fact that it is effectively impossible to determine when an NSR permit is required, refiners must somehow decide whether an anticipated action triggers NSR permitting and controls. If it does, they must obtain the required permit before beginning any construction, install appropriate emissions control technology, and perhaps meet other requirements as well. On average it takes 18 months to 2 years to get an NSR permit.

State NSR decisions may also not reflect the EPA's latest positions. The EPA has delegated the program to most States but is now investigating State permitting decisions affecting refineries over the last 20 years. These decisions were not questioned during 20 years of State and EPA inspections. Refineries are in a quandary because State decisions may not be supported by EPA, while EPA's own guidance is difficult to find and often contradictory or confusing when located.

Some EPA officials, however, do seem to realize these problems. Talks have recently taken place between EPA and representatives of several affected industries to discuss the need for NSR reform. API and NPRA have been participants. We are encouraged by the discussion that has occurred and hope that more talks will be scheduled. The EPA has also participated in one industry workshop regarding ways to expedite permitting relative to the gasoline sulfur rule. A joint workshop will be held next month. We appreciate EPA's commitment to these efforts but believe that underlying NSR reform is needed to provide us and other affected industries with greater certainty. We need an NSR process that is simple, efficient and transparent.

Our thanks to you, Mr. Chairman, and you, Senator Voinovich, for your interest in this important issue. I look forward to answering your questions.

Senator INHOFE. Thank you, Mr. Slaughter.

Henson?

STATEMENT OF W. HENSON MOORE, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN FOREST AND PAPER ASSOCIATION

Mr. MOORE. Mr. Chairman and Senator Voinovich, thank you both for having this hearing. I'm Henson Moore, the President of the American Forest and Paper Association. We think the NSR program ought to meet a few basic principles. They ought to be consistent. They ought to follow congressional intent. It ought not be changed retroactively, that they should benefit the environment, and the program regulators, the program office, not the enforcers, ought to set new changes in policies and ought to be open to public scrutiny. Based on these principles today's NSR program is broken. We're not the only ones that think that. The EPA itself thinks it's broken. The States do. Republicans and Democrats in Congress do.

And we have a statement we would like to include in the record, Mr. Chairman, from unions in our industry representing a quarter of a million of our workers who also feel this program is broken.

Basically it's broken because when it requires a permit, something that takes—in the case of our industry we're seeing somewhere between a year and a year-and-a-half to get one of these permits for a physical change, we think this is something that ought to be looked at very carefully. Congress never intended NSR to impose new controls on equipment simply because of routine maintenance. The idea was if you're doing something that's going to increase emissions, you ought to go get a permit. We agree to that. The problem is not congressional intent. It's the way it's being implemented. Furthermore, it's confusing.

Mr. Chairman, you've got a few pages in the United States Code that deal with this. These citations deal with New Source Review. Here are 4,000 pages of conflicting guidelines, regulations, and rules put out by EPA and various offices of EPA to interpret these few pages. That's the problem. The program is so complicated. It's so conflicting. It's so difficult to deal with. Nobody in the EPA knows how it works, and certainly the people trying to conform to it don't know how it works.

Let me give you an example of routine maintenance. In 1980 EPA provided an exclusion from NSR review for routine maintenance. We operated fine under that for 8 years. Then EPA came out and said, well, we're going to change that. We're going to weigh a variety of factors to arrive at a common sense finding of what was routine maintenance. We operated with that. Then last year, the enforcement office now, the people who actually fine you and hold you in violation of the rules, substantially narrowed this exclusion and without any public input stated it was meant to cover, I quote, ''frequent, traditional, and comparatively inexpensive repairs to maintain existing equipment.'' That's a 180-degree change. Now you are liable retroactively for fines and penalties back to 1980 when you were told it was OK and there is no amount of permitting time for this kind of routine matter that is acceptable. Even if you got it down to 6 months, as Mr. Seitz said, or 3 months, you still can't run a business based on this kind of a holdup, waiting to see if you can get something routinely done without risking fines on a per diem basis. So the first problem is you've got to reform NSR to make it work. This is not workable. Nobody thinks it is. It needs to be changed.

But you've also got another problem. The problem is the unfair and egregious enforcement of these retroactive rules, interpreting and changing rules and applying them retroactively and applying fines. For example, 10 years ago we had a mill that replaced an old power boiler with a new one that had potential lower emissions. The State, after getting comments from EPA, said this is OK and gave us the approval to go ahead and proceed. Now EPA says the boiler increases mill operating capacity and potential emissions and, therefore, alleges the mill failed to comply with NSR requirements and is now asking for fines going back 10 years when, in fact, it was cleared by the State. There have been no increase in emissions. And actually, at the time it was thought it would have potential lower emissions. There are other examples.

Now we're not quarreling with implementation of the law, where somebody, as Mr. Seitz says, where you've got a change of a stationary source that increases emissions. If that's the case, you ought to go throught NSR; and if you didn't do that and get a permit you are liable, and it's OK to go back no matter how long you have to go back to enforce that kind of a situation. Now we're talking about potential, phantom emission increases. We're talking about not actual changes at all or actual changes in the emissions from these plants. Therefore, we feel like EPA ought to suspend these enforcement actions—against anybody that has not actually increased emissions until such time as they finish the reforms in the regulations themselves. This is a program that is broken and needs to be fixed. And unfortunately, they are continuing to break the rules retroactively through the enforcement procedures to make it even more egregious and make it worse.

Senator INHOFE. Thank you, Mr. Moore. Are you going to submit that document you held up?

Mr. MOORE. This one, but not this one. If you want them, you're welcome to them.

Senator INHOFE. That reminds me a little bit of in the 1980's a State of Union message that I heard when they brought the tax

code out. No, I'm talking about the document on the workers that were affected——

Mr. MOORE. Yes, that's this one.

Senator INHOFE. Thank you very much.

[The referenced document follows:]

STATEMENT OF MICHAEL DRAPER, CHAIRMAN, FOREST PRODUCTS INDUSTRY NATIONAL LABOR MANAGEMENT COMMITTEE

On behalf of the Forest Products Industry National Labor Management Committee (LMC), I would like to submit the following statement for the record.

The LMC is a coalition of labor unions and forest products associations formed 10 years ago to pursue the conunon goals of the working men and women of our industry. Collectively, the LMC represents over 2 million workers nationwide, include 250,000 forest products workers. Our members are employed in hundreds of wood, pulp and paper manufacturing cities throughout the nation, producing the products used by consumers in households, offices and schools across the globe.

I began my career as a member of the United Brotherhood of Carpenters and Joiners of America (UBCIA) in a sawmill in California. Today, I am the Regional Vice President for the UBCJA and represent workers across the Western United States. The forest products industry—both the wood and paper sectors—has been devastated over the last decade due to a decline in timber harvests and restrictions on manufacturing facilities. I have personally seen entire towns destroyed as local mills shut their doors because they were no longer able to compete, sending thousands of workers to the unemployment line. Throughout my proud career, I have had the oppose to work with thousands of individuals, including community leaders, county officials, working families, environmental groups, local and State legislators, as well as leaders in Washington, DC—all in pursuit of a common goal to provide the best public policy solutions for forest products workers and rural communities.

The forest products industry and its workers depend upon the environment for our livelihooods, and working together, our Coalition is proud of our strong record of environmental stewardship and we recognize our responsibilities to ensure a cleaner environment for all Americans. We have come a long way over the last decade, and increasingly our industry continues to embrace new standards in environmental stewardship, including the American Forest and Paper Association's Sustainable Forestry Initiative (SFI)'sm, The SFIsm is an innovative approach to securing the proper guidelines and principles to providing sound scientific practices to protect our air, water and land.

On behalf of the working men and women in pulp and paper manufacturing facilities throughout the nation, I am submitting this statement today out of concern for the Environmental Protection Agency's New Source Review (NSR) program. We support the Agency's goal of providing a cleaner and safer environment for all Americans, yet are concerned that the NSR program is not working and the complexities of the guidelines are dwarfing its ultimate mission.

The Environmental Protection Agency is currently reviewing what the Agency admits is a "broken" New Source Review (NSR) program. First established under the 1917 Clean Air Act Amendments, the NSR program is considered to be the Act's single-most complicated regulatory program. As a result, our industry has struggled to understand and comply with the regulations, which stem from more than 4,000 pages of interpretive guidance.

Oftentimes, decisions orally approved by the Agency are overturned several years later based on changes in interpretive guidance that did not exist at the time the original compliance decision was made. In a 1996 proposal to reform the Cleen Air Act, the Agency explained that it had specifically recognized that routine maintenance, repair and replacement did not trigger the modification rule. Now, the NSR program is being interpreted to cover virtually anything the pulp and paper industry is doing to expand, improve operations and make equipment changes to meet environmental requirements, even when these changes reduce emissions and improve efficiency.

Today, the guidelines of the NSR program are confusing and oftentimes inconsistent and contradictory, which is ultimately hampering our ability to successfully compete in the global market. The complexities are impeding innovation, inhibiting the use of new technologies or forestalling attempts to enhance environmental performance and energy efficiency. Our manufacturing facilities are shelving these plans, stifling new opportunities for growth and development.

Yet even more troublesome is the fact the the Agency is moving ahead with a new enforcement initiative before the NSR program is fixed. Manufacturing facilities are

facing penalties reaching $25,000 per day starting when the actual construction or modifications began, in some cases going back nearly 20 years! Our industry estimates that the initiative could cost as much $10 to $50 million per mill, a price tag that would halt production and force many of our plants to shut their doors. The end result: high-skill, living wage jobs will be sent overseas.

The demand for our products is high and we must all work to keep these jobs on American soil. Natural resources are an integral part of our work; the environment is our Trade—from the products we produce, to the air we breathe and the water we drink. It is critical that we work toward the best policy solutions to balance the environmental, social and economic needs of our society. We are all committed to a common mission, so let's work together to sustain a healthy environment for future generations.

Today, we ask our leaders in Congress to work with the Environmental Protection Agency and all shareholders to create and quickly implement a reformed NSR program—a new program that will not stifle innovation and cost American jobs—a new program that will be fair, consistent and allow smallholders to comply in the spirit of law, providing a cleaner and safer environment for our children and grandchildren.

Senator INHOFE. Mr. Hawkins?

STATEMENT OF DAVID HAWKINS, NATURAL RESOURCES DEFENSE COUNCIL

Mr. HAWKINS. Thank you, Senator. Well, looking at this stack, no one can argue that the program has been bad for the paper industry.

Senator, thank you. Most of today's witnesses have focused on the problems that the Clean Air Act presents for polluting sources. I'd like to comment on the problems that are presented for our members and your constituents, particularly the elderly and children, whose health is at risk from today's pollution burden.

Just last week Ohio environmental groups published a report on the continuing problem of smog in the Ohio River Valley that documented the large number of adverse health effects, including over 83,000 asthma attacks that were directly attributable to elevated smog, over a thousand emergency room visits, over 600 hospital admissions. Now it's important to understand how much of a smog problem is due to old, grandfathered pollution sources, ones that should have been cleaned up under the Clean Air Act but have not been.

For example, fossil electric power plants are major contributors to smog and soot problems. What's astonishing is how much those older plants dominate the inventory for that sector. Over 80 percent of the total U.S. emissions from fossil electric generating plants for sulfur and nitrogen emissions come from power plants built more than 20 years ago. Now contrast that to the motor vehicle program. In the motor vehicle program 20 year old cars contribute to less than 7 percent of NOx emissions. If we had the problem with motor vehicles that today's power plants represent in terms of old sources, we would all be choking to death quite literally.

Why is this? Well, because contrary to the expectation of Congress old plants have been kept running. They have been kept running rather than being replaced by cleaner sources. Many of these actions were due to loopholes in the law. But too many instances the strategies of keeping plants running have been carried out without complying with NSR requirements.

The courts are going to decide based on the facts in particular cases, so I'm not going to get into the facts in particular cases. But let me comment on a couple of broad arguments that were repeated

here today. The first is, "It's all just routine maintenance." And the second is, "EPA has changed the rules."

On the first point, the claim that everything is just routine maintenance is a rewriting of history. I have here two large volumes of proceedings of electric industry conferences held in the mid 1980's. All of the documents in these two volumes relate to programs to extend the life of existing coal-fired power plants by another 20 to 30 years past the design life of those facilities. And just to quote from the proceedings themselves, at the beginning of this 1984 document it says: "Typically the fossil fuel power plant is designed for a 30-year life. But as new fossil plants become increasingly difficult to finance, efforts are being made to extend the life of aging fossil plants to 50 or 60 years of reliable service."

In this 1984 conference 27 out of the 33 utility companies that were surveyed said they had begun or were planning life extension programs. And I would like to submit that survey for the record, if I might.

Senator INHOFE. Without objection.

[The referenced survey follows:]

PROCEEDINGS: FOSSIL PLANT LIFE EXTENSION CONFERENCE AND WORKSHOP

Washington, DC, June 12–15, 1984

Workshop Director J. R. Scheibel

Prepared for Electric Power Research Institute

SYNOPSIS OF QUESTIONNAIRE RESULTS FOR EPRI PLANT LIFE EXTENSION WORKSHOP JUNE 12–15, 1984

Plant life extension will play an increasingly important role in meeting U.S. generating requirements. This fact was made apparent in the utility responses to questionnaires concluding the June 12–15 workshop held in Washington, D.C. Approximately 94 percent of 33 responding utilities expect plant life extension to play a significant role in meeting their system demand in the future. Of the utilities expecting plant life extension to play a significant role in meeting their system demand, 40 percent have already implemented such a program, 10 percent expect to implement a plant life extension program within 5 years, and the remaining 50 percent plan to implement a plant life extension program within 20 years.

Six principal considerations stand out for establishing a power plant as a candidate for life extension. They are, in order of importance:

- Plant age.
- System load demand and future expectation.
- Physical plant condition.
- Operating Efficiency.
- Availability.
- Maintenance costs.

Other considerations identified by the responding utilities as considerations for establishing a plant as a candidate for life extension include: 1) plant replacement cost, 2) proximity to load, 3) operating costs, 4) fuel availability, 5) operating history, 6) politics, 7) new pollution control equipment, and 8) safety.

The responding utilities indicated that plant life extension studies are generally carried out in house. This is primarily dependent on having adequate in-house engineering staff and expertise to support the study or studies. Where the magnitude of the effort exceeds the utilities technical resources, assistance from OEMs and A/Es is obtained.

The utilities identified four units that have already had their life extended, or are scheduled for completion in 1984. One additional unit is scheduled for completion in 1986. Life extension studies have been completed for another 43 units, most of which have begun plant modifications and are in various states of completion, though no specific completion dates are identified. An additional 134 units have

been identified as candidates for study or presently being evaluated for life extension.

Noted units range in size from 40 MW to 900 MW with coal being the predominant fuel Present age of the subject units ranges from 10 years to 49 years with the greatest concentration of units in the 20- to 35-year bracket. Desired total service life, including the extended life period, is from 50 to 60 years. Of the 139 units identified thus far for plant life extension, the predominant operating mode intended is for cycling and/or baseload service. Approximately 52 percent of the units will operate in cycling service while 43 percent of the units will be base loaded. The remaining 5 percent will operate in peaking service or load following mode. One unit is scheduled for mothballing.

In addition to the units noted above, 15 additional units are slated for conversion from their design condition fuel. Nine are to be converted from oil or gas firing to coal, and six units will be converted to either atmospheric fluidized bed combustion (AFBC) or integrated gasification combined cycle plants. Fourteen of the 15 units are 80 MW and under in size, while one unit is 250 MW. Unit ages range from 28 to 40 years, with an average age around 32 years.

The utilities identified three principal areas for uncertainty when evaluating plants for life extension. In order of importance, these uncertainties are:

- Estimating remaining life.
- Evaluation of boiler and turbine.
- Evaluation of headers, drums, and piping.

Other uncertainties identified include: 1) verification of life extension and uprating, 2) material properties, 3) evaluation of electrical components, 4) generation planning and costs, including maintenance cost to support target availability, 5) evaluations requiring historical OEM data, 6) environmental considerations, and 7) probability of major failures.

The utilities see a very significant role for diagnostic monitoring equipment including: vibration, stress, and condition analyzers during the extended life period.

The utilities noted that they would like future workshops planned on plant life extension. Primary areas of interest, listed in order of preference, include:

- Concentration on utilities' findings.
- Update on ongoing projects.
- Methodologies.
- Equipment evaluation and diagnostics.
- Remaining life estimation.
- Program planning.
- Metallurgy and electrical components.
- Generic problems.
- High pressure piping.
- Instrumentation and controls.

In order of preference, the utilities desire EPRI to undertake development programs in the following areas to assist in their carrying out or implementing life extension activities:

Boiler life extension—Drums and headers
—Superheaters and reheaters
—Waterwalls
—Controls
—Structural members
—Burners
—Fans
—Pulverizers and feeders
—Valves and piping
—Ductwork
—Fabric expansion joints.

- Balance of plant evaluation

—Piping
—Controls.
—Feedwater heaters
—Condensers
—Pumps
—Valves
—Motors
—Transformers
—Switchgear
—Cable, wiring
—Precipitators

—Cooling towers
—Deaerators.
- Turbine life evaluation

—Shafts
—Generators
—Blades Discs
—Controls
—Bearings.
- Generation planning studies.

QUESTIONNAIRE SUMMARY

EPRI PLANT LIFE EXTENSION WORKSHOP

JUNE 12-15, 1984

1. Do you expect plant life extension to play a significant role in meeting system demand in the next:

   5 years? Yes 15
   20 years? Yes 16
   Don't know 2

2. Has your company established a plant life extension program?

   Yes 12
   No 21

   If no, do you have plans to do so?

   Yes 15
   No 6

3. What are the principal considerations which establish a plant as a candidate for life extension?

   A. Age, efficiency, fuel, operating history, system load demands 1
   B. Maintenance costs, availability 1
   C. Age, duty demand 7
   D. Cost and politics 1
   E. Age, availability, well maintained, well built 1
   F. Age, RH, new pollution control equipment 1
   G. Proximity to load 1
   H. Age, efficiency, location, existing condition 2
   I. Over 30 years old, coal fired, still in good condition 1
   J. Age, availability, maintenance 3
   K. Good heat rate, fuel cost and availability 1
   L. Age, condition, operating expectation 5
   M. Efficiency, maintenance costs, available alternatives 2
   N. RH, heat rate, condition 1
   O. Age and replacement cost 2
   P. Availability, performance, safety 1

4. To what extent are life extension studies carried out in-house? How much assistance is obtained from manufacturers? From A/Es?

   A. A/E supplement to owner to evaluate manufacturers' recommendations 2
   B. Mostly in-house 10
   C. Availability programs in-house; A/E for life extension 1
   D. In-house with help from vendors 6
   E. Manufacturers for boiler/turbine; BOP in-house and A/E 2

4. (continued)
   F. Initial studies will use A/E, boiler and turbine manufacturer __2__
   G. Mostly outside, coordinated by A/E __1__
   H. In-house, A/E, and OEMs __1__

5. See Attachment A

6. In what areas of evaluation are the greatest uncertainties found?

   A. Verifying results of life extension and uprating __1__
   B. Material properties __1__
   C. Remaining life __6__
   D. Boiler __3__
   E. Drums, headers, electrical components __1__
   F. Generation planning and forecasting __2__
   G. Headers, drums, and piping __3__
   H. Environmental impact on future coal costs; maintenance costs to support target availability __1__
   I. Evaluations requiring historical O&M data __1__
   J. Boilers and turbines __4__
   K. Environmental considerations __1__
   L. Probability of major failures __1__

7. What do you see as the role of diagnostic monitoring equipment such as vibration, stress, and condition analyzers?

   A. Cost effectiveness needs to be confirmed __2__
   B. Limited __2__
   C. Not useful __1__
   D. Very significant __10__
   E. Increased use __7__
   F. Predicting life probability __1__
   G. Needed to develop data __2__
   H. No plans to use them __1__
   I. Possible turbine vibration system upgrading __1__

8. How beneficial has this workshop been?

   A. Very __22__
   B. Moderately __10__

9. Would you recommend another workshop?

   A. Yes __32__ In 1 year? __21__ In 2 years? __11__
   B. No __0__

10. In what areas should a future workshop concentrate?

   A. Concentrate on utilities' findings __8__
   B. Program planning __2__
   C. Remaining life analysis interface with other aspects __1__
   D. Methodologies __3__
   E. Equipment evaluation and diagnostics __3__
   F. Metallurgy and electrical components including wire __1__
   G. Include update on ongoing projects __5__
   H. Remaining life estimation and failure probabilities __2__
   I. Presentations on generic problem areas by manufacturers __1__
   J. How to establish need __1__

10. (continued)
    K. More specifics, less generalities 2
    L. High pressure piping 1
    M. Add more emphasis on instruments and controls 1

11. Do you have other comments or recommendations?

    A. More discussion among utilities 1
    B. Need to promulgate importance of verified remaining life assessment 1
    C. Less A/E, more company experience 1
    D. Exclude A/E and manufacturers' sales pitches 3
    E. Screen papers to delete redundancy and unrelated matters 4
    F. Identify safety as a goal of life extension studies; consider establishing a clearing house for accidents or near misses 1
    G. Little distinction was made between activities required to extend life and prudent routine maintenance 1

In which of the following areas could EPRI undertake development programs which would assist you in carrying out studies or implementing life extension activities?

Generation planning studies	8	Balance of plant evaluation	
Boiler life evaluation		Pumps	9
Waterwalls	14	Feedwater heaters	12
Superheaters and reheaters	20	Condensers	10
Drums and headers	27	Piping	16
Structural members	8	Valves	8
Ductwork	4	Controls	13
Valves and piping	5	Switchgear	4
Pulverizers and feeders	6	Motors	7
Burners	8	Transformers	5
Fans	7	Other: Electrical	1
Controls	13	Components (incl wire)	
Other: Fabric Exp Joints	1	Cable Wiring	2
Turbine Life Evaluation		Precipitators	1
Shafts	16	Deaerators	1
Discs	9		
Blades	11		
Bearings	6		
Controls	8		
Generator	13		

UNITS UNDER CONSIDERATION OR STUDY
FOR LIFE EXTENSION

ATTACHMENT A

UTILITY	UNIT	SIZE MW	FUEL	AGE	PROPOSED OPERATING MODE	INTENDED LIFE EXTENSION	STUDY STATUS
Atlantic Electric	Deepwater #1	80	Oil	25	Cycling	25	1984Completion
	Deepwater #6/8	80	Coal	30	Base	25	"
	B.L.England #3	160	Oil	10	Cycling	25	"
Carolina Pwr&Lght	Weatherspoon#3	78	Coal	27	Cycling	Indef.	Developing Methodology
CentralMainPower	WmF.Wyman#3	120	Oil	20	Cycling	?	Starting
CininnatiGas&Elect	W.C.Beckjord#2	94	Coal	31	Cycling	30	InProgress
	W.C.Beckjord#3	128	Coal	30	Cycling	30	"
CEI	Eastlake#1,2,3	125	Coal	30	Cycling	?	Starting
ConEdison	Ravenswood#1	363	Oil/Gas	23	Cycling	20	EPRI ProposalSubmitted
	12in-city units	Tol000	?	15-24	Base	?	?
ConsumersPower	Whiting#1,2	100	Coal	32	Base	?	Starting
	Whiting#3	125	Coal	32	Base	?	"
DaytonPwr&Lght	Hutchings#3,4,5,	60	Coal	32	Peaking	20-30	Initial Planning
Delmarva Power	EdgeMoor3	90	Coal	28	Base	20	Start Late 1984
	IndianRiver#1,2	70	Coal	33	Base	20	"
DetroitEdison	RiverRouge#2	250	Coal	28	Cycling	20	UnderConsideration
DukePower	Allen#1-5	1656275	Coal	20/25	Cycling	20	Study Completed
GPU	Seward	90	Coal	30	Cycling	20	1985 Study
	Warren	160	Coal	33	Cycling	20	1984 Study
	Williams	50	Coal	40	Cycling	20	"
	Shawville	160	Coal	30	Cycling	20	1985 Study
HawaiianElectric	Waiau#3	50	Oil	37	Cycling	25	Not Started
	Waiau#4	50	Oil	34	Cycling	25	"
IowaPublicService	Maynard#7	70	Coal	25	Cycling	25	?
	Neal#1	135	Coal	20	Cycling	25	?

UNITS UNDER CONSIDERATION OR STUDY
FOR LIFE EXTENSION

ATTACHMENT A

UTILITY	UNIT	SIZE MW	FUEL	AGE	PROPOSED OPERATING MODE	INTENDED LIFE EXTENSION	STUDY STATUS
KansasCityPwr&Lt	Montrose#1	170	Coal	26	Cycling	20	Starting
	Montrose#2	170	Coal	24	Mothball	-	"
	Montrose#3	170	Coal	21	Cycling	20	"
MinnesotaPower	C.Boswell#1	70	Coal	26/27	LoadFollow	?	"
NiagaraMohawk	Huntley#1to6	100&200	Coal	25-30	Base/Cycle	20	1985-1988Plan-
	Dunkirk#1to4	100&200	Coal	25-43	Base	20	BeingDeveloped
NorthernStatesPwr	BlackDog#2	100	Coal	32	2 Shift	30	1986Completion
OhioEdison	25 Units	48to600	?	13-45	Base/Cycle	30	ToBeAddressed-1985
Penelec	8 Units	40to900	?	15-40	Base/Cycle	20	HalfThru First 3 Units
PennPwr&Lght	?	70	Coal	30	Base	25	In Progress
	?	750	Coal	14	Base	25	"
	?	850	Coal	7	Cycling	25	"
PhiladelphiaElect	Eddystone#1,2	320	Coal	26/27	Cycling	20	Not Started
	Cromby#1	150	Coal	30	On-Off	20	"
	Cromby#2	210	Oil	29	On-Off	20	"
PublicServIndiana	14 Units	60to150	Coal	25-40	Cycling	25	"
SouthernCoServices	30 Units	-	-	-	-	-	BeingScreenedForCandidates
UtahPower&Light	Gadsby#1,2,3	60to100	Gas/Coal	30	?	20	Beginning
	Carbon#1,2	100	Coal	25	?	20	"
	Naughton#1,2	100/125	Coal	20/25	?	20	"
VirginiaPower&Lght	Mt.Storm#1,2	550	Coal	18/19	Base	35	"
	Mt.Storm#3	600	Coal	13	Base	35	"
	Chesterfield#6	700	Coal	15	Base	35	"
Unidentified	5 Units	80	Coal	34-49	Cycling	11-18	In Progress
	2 Units	120	Coal	31/32	Cycling	25	"
	2 Units	130	Coal	27/29	Cycling	25	"
	2 Units	275	Coal	23/25	Base	35	"
	2 Units	310	Coal	17/19	Base	35	"

ATTACHMENT A

UNITS WITH LIFE EXTENSION WORK UNDERWAY OR COMPLETED

UTILITY	UNIT	SIZE	FUEL	AGE	EXPECTED OPERATING MODE	INTENDED LIFE EXTENSION	INVESTMENT IN LIFE EXTENSION	EVALUATION PERFORMED BY	STATUS
CincinnatiGas&Elect	W.C.Beckjord#1	94	Coal	32	Cycling	30	<10Mill	In-house	SomeWorkCompleted
DaytonPower&Light	Hutchings#1,2	60	Coal	34	Peaking	20-30	?	In-house	PartiallyComplete
DukePower	DanRiver#1,2,3	65&150	Coal	29-34	Cycling	20	~10Mill	In-house	StartThisFall
GPU	FrontStreet	140	Coal	41	Cycling	20	?	MPR	Underway
HoustonLighting&Pwr	SamBertron#1,2	180	Coal	26	Cycling	?	?	In-house	Underway
	W.A.Parish#1,2	183	Coal	26	Cycling	?	?	In-house	Underway
	Deepwater#7	180	Coal	29	Cycling	?	?	In-house	Underway

UNITS BEING CONSIDERED FOR CONVERSION TO COAL OR FOR REPOWERING

UTILITY	UNIT	SIZE	PRESENT FUEL	AGE	MODIFICATION	STATUS
CentralMainePower	Mason#3,4,5	30	#6 Oil	28-32	ConversionToSub.Bit.Coal	DeferredForFunding
CEI	Ashtabula#6-9	50	Coal	35	AFBC or IGCC	BeingConsidered
	Avon#6,7	75	Coal	33	AFBC or IGCC	BeingConsidered
DetroitEdison	RiverRouge#1	250	Oil	29	Conversion To Coal	UnderStudy
PublicServIndiana	Edwardsport#6	65	Oil	40	ConversionToBit.Coal	Inactive
UtahPower&Light	Gadsby#1	60	Gas	32	ConversionToWesternCoal	OnStandby
VirginiaElectPower	Portsmith#1,2	80	Oil	30	Conversion To Coal	Under Study

Mr. HAWKINS. The conference participants were clear that these life extension efforts involved much more than routine maintenance, and I'd like to quote from a paper delivered by Duke Power. Duke Power said: "As in the case with most U.S. utilities, Duke Power has experienced a major change in operating philosophy in the past several years. This necessitated us developing a different approach than routine plant maintenance, which would have been responsive to the new schedule constraints. Plant maintenance program previously employed did an excellent job in minimizing cost outlays versus keeping this plant in service until the end of its design life. This program simply can't be applied to the present situation."

At another industry conference 2 years later TVA described how it had begun its fossil and hydro unit evaluation and modernization program in 1984 with the primary goal: "to extend plant life 20 or more years beyond its design life of 35 to 40 years."

Cincinnati Gas and Electric presented a detailed paper describing its life extension project at the Beckjord Unit 3, which involved 49 capital improvement projects which the paper distinguished from normal maintenance. And I'd like to submit that for the record.

Senator INHOFE. Without objection, it will be entered into the record.

[The referenced report follows:]

LIFE EXTENSION AND ASSESSMENT OF FOSSIL POWER PLANTS

CONFERENCE PROCEEDINGS

(Editors, Barry Dooley and Ramaswamy Viswanathan)

ABSTRACT

A great many utilities across the country have included Life Extension as an integral part of their generation expansion plans. Life Extension has temporarily replaced new construction. Most of these utilities have adopted a "phased" approach to Life Extension of candidate units. The Cincinnati Gas 6 Electric Company's W. C. Beckiord Station-Unit 3 is the first generating unit in the country to complete a "full" instead of "phased" life extension program. During a 13-week outage which

ended in January, 1986, all life extensive modifications recommended as a result of extensive studies were implemented. A total of forty-nine replacement and/or modification projects were performed to add approximately 25 years to the unit's life at a total cost of less than $100/kW. The planning, coordination and project management utilized to inspect and evaluate the condition of the unit, procure materials, equipment, and contractors and complete the installation and startup are discussed in detail.

BACKGROUND

LL C. Beckjord Station is located on the Ohio River near New Richmond, Ohio, approximately 17 miles upstream from Cincinnati, Ohio. Unit 3 has a rated capacity of 128 MW and was placed into service in 1954. The unit consists of B&L front fired single reheat pulverized coal boiler and a General Electric tandem compound two flow turbine. Steam conditions are 1800 psig/1000 deg. F/1000 deg. F.

The unit was conservatively designed, well-built, and has been well- maintained. Its heat rates and availability have been favorable. An analysis of CO&E's generation expansion plan identified Unit 3 as the prime candidate for life extension.

STUDIES

For 30 years, the plant operators, maintenance and other support personnel have worked with the unit. They know it well; they know its limitations and its strong points. They have a good idea of what equipment is or is not suitable for another twenty-five years. This knowledge is a valuable source of information. In our studies, it was used to build the foundation for our detailed investigations. It allowed us to focus our resources on specific areas.

Our preliminary studies had estimated a cost of $89/kW to extend the life of Unit 3.

One of the most questionable areas in the determination of remaining life is turbine-generators, especially rotors and shells. We realized that this equipment is highly engineered and that much of the information required to properly evaluate this equipment is proprietary by the manufacturer, General . Electric. In the case of Unit 3, General Electric had been involved in every turbine overhaul since the initial startup. For these reasons, GE was contracted to perform a life extension evaluation of the turbine-generator equipment. This study was initiated in September 1983, and completed in February, 1984.

The GE study of the turbine-generator supported our original estimate. Management approval was obtained in June, 1984, to proceed with life extension. A 13 week outage was scheduled for the fall of 1985.

A team was assembled to investigate the remaining areas of the unit. Organization of the study team is shown in Figure 1. The Boiler Plant study was conducted by our in-house engineering personnel with assistance in the evaluation of high temperature components from Babcock & Wilcox. Electrical equipment and structures were also evaluated by in-house personnel. Bechtel Associates was contracted to perform the life extension evaluations of balance of plant equipment. Bechtel was responsible for basically all other equipment not supplied by either the original boiler or turbine contractor??

These studies were formally kicked off in July, 1984, and were completed in February, 1985, as scheduled. This demanding schedule was complicated by the need to conduct the inspection during a 2-week period. This required special considerations and careful planning. The inspection work was carefully staged and scheduled so that the unit could be returned to service within 24 hours notice if required for load.

SCOPE OF WORK

As a result of the study, 49 capital improvement projects were identified for the life extension outage. CG&E defines capital projects in accordance with Federal Energy Regulatory Commission guidelines. A list of these refurbishment projects is provided in Table I.

A MAJOR PROJECT WITP A MINOR SCHEDULE

At the time of our inspections, the outage to implement the recommendations of those inspe * ions was less than 1 year away. Action had to be taken to expedite procurement of long lead time items. Our requirements for obtaining competitive pricing could not be compromised and, before we could proceed with any purchase, our evaluation and cost justification for the replacement or modification had to be approved.

It was obvious, that in order to maintain our commitment to the outage schedule, we must utilize some of the project controls normally reserved for major, new construction projects.

WCB–3—LIFE EXTENSION CAPITAL WORK

- Turbine Related

Bucket Replacement (5 rows)
Steam Seal Conversion
HP Inner Shell Replacement
Static Exciter
Stop Valve Bypass Valve Installation
Generator Field Rewind
Generator Stator Rewind
Starting & Loading Thermocouples
Misc. Control Improvements
Condenser Retubing
Fine Mesh Screens.

- Boiler Related

Bunker Replacement
ID Fan Drive Replacement
Demineralizer Replacement
Combustion Controls
Service Water Piping Replacement
Water Sampling Room
Annunciator Replacement
Boiler Skin Casing
Insulation Replacement
Ignitor Replacement
Feeder Motor Replacement
Secondary Air Dampers
Primary Air Fan Replacement
Sootblowers Replacement
Secondary Superheater
High Temp. Headers (3)
Primary Reheater
Secondary Reheater
Uninterruptible Power Supply
Misc. Control and Panel Equipment.

Total Project cost approximately $13,000,000, including all engineering, overheads, and allowance for funds.

Table I

We had recently acquired the PREMIS critical path method scheduling program. In the past, on major projects, our scheduling work had always been handled by outside consultants. As soon as we were able to identify a potential replacement or modification for the outage, action was taken to input the schedule into the PREMIS program. Our primary concerns at this point were to:

1. Order and receive all materials and equipment prior to the first day of the outage, and
2. Complete all engineering and drafting in-time to allow for obtaining competitive bids, and
3. Award installation contracts in time to allow contractors to prepare detailed installation schedules.

On this project, our plans were to complete all engineering in-house for capital projects. Many of our engineering personnel were unfamiliar with the PREMIS program. To expedite the input of information, standard forms were prepared that listed the normal steps in the engineering-procurement-drafting process in our company. The engineer simply had to fill in the estimated time to complete each step in the process and/or fix the date when the step had to be complete. These forms greatly simplified the schedule formation process.

Once the PREMIS schedules were input, the critical paths were identified and we were able to concentrate our efforts on those items in trouble.

CONTRACTORS

It has been our experience that the fewer contractors on the jobsite, the easier it is to control the project. Limiting the contractors also limits the "finger-pointing" and simplifies coordination. For this project, installation contractors were chosen for the following work packages:

- Turbine-Generator
- Boiler
- Electrical
- Piping
- Condenser
- Asbestos Removal
- Insulation.

Besides the capital work involved in the life extension project, there was a large amount of maintenance work identified by the plant that had to be included in the work packages. This required a close working relationship between engineering and plant personnel related to the outage.

The turbine-generator installation contract was awarded to General Electric. Much of this work, especially service shop work, was awarded on a firm price basis. Late in the outage, problems were found with the stator windings in the generator. National Electric Coil was contracted to manufacture and install the new stator windings without impacting the outage schedule.

Competitive bids were obtained for the boiler work. Babcock & Wilcox was successful. This scope of work was by far the most extensive of the project. B&W was also successful supplier of all of the boiler material being installed in this work package. This offered a great advantage since we were able to negotiate a single source responsibility from B&W for both materials and installation.

This project involved the removal of asbestos bearing insulation from the entire boiler, (over 15,000 sq. ft.). Both the removal and the replacement were performed on firm price, competitive bid contracts. R. E. Kramig Co. of Cincinnati, Ohio performed the removal. Powerhouse Equipment of Akron, Ohio performed the replacement.

All electrical work was assembled into a package and awarded to a local Contractor' Watson-Flagg. Likewise, all piping work (except for boiler related) was assembled in a package and awarded by competitive bid to a local piping contractor, Mechanicals, Inc.

The condenser retubing and installation of ID fan drives (both in secluded areas of the plant) were bid separately and awarded to a local contractor, Enerfab.

Each of the installation contractors were required to provide detailed Schedules within several weeks of award. These bar charts were required to include each step of the installation process and men per shift per day for each of these steps. This data became the basis for the project outage schedule.

Prior to award of the installation contracts on this project, our management negotiated an agreement with the National Maintenance Policy Committee for craft labor of signatory unions to work at 90 percent of full scale wages. This resulted in a considerable savings in installation cost for this project.

THE OUTAGE TEAM

As with any major project, a field engineering staff is necessary to service construction and administer the contractors. When our last new unit was completed, our normal field construction staff was reassigned. A new team with special characteristics had to be assembled for this project. These special characteristics for the Outage Team were:

1. A clear understanding of existing plant operations and good working relationships with plant personnel.
2. A familiarization with the modifications and equipment to be installed. The outage length did not allow time for someone to be trained.
3. The tenacity necessary to effectively manage contractor personnel.
4. A willingness to devote long hours to the project.

Fulfilling these objectives required a mix of engineering and plant personnel. Our General Engineering and Electric Production Departments each contributed individuals to the Outage Team. Temporary reassignments were made. The Outage Coordinator was brought in from another generating plant, thereby allowing for his undivided attention to the project. The organization is shown in Figure 2. The Outage Coordinator was directly responsible for the outage work. His team of Field Engineers were the single source contacts for the contractors. It was the responsibility of the Life Extension Project Leader to procure equipment and contractors. It was the Outage Coordinator's responsibility to see that the contracts are carried out.

The Outage Team was located in a room off the Turbine Room fittingly called "Outage Central". An outage board 35 foot long by 8 feet high (see Figure 3) displayed all schedules for boiler and balance of plant equipment installations. A smaller board on the opposite wall displayed turbine work. These boards were the focal point of daily contractor meetings. Each morning at 8:30 a.m. all contractor rep-

resentatives grouped to discuss progress from the proceeding day and activities to take place that day. If activities scheduled for the previous day were not completed as scheduled, they were moved back and their impact on other operations and the overall schedule could be assessed immediately. These meetings could be intimidating and were an effective tool. The discussion of daily activity by each contractor was very effective in minimizing lack of coordination problems. The contractors were also responsible for reporting their manpower levels at these meetings.

THE OUTAGE

The outage was scheduled for October 25, 1985 thru January 25, 1986. The first 15 days of the outage were used exclusively for asbestos insulation removal. The entire boiler area from ash hopper to penthouse was enclosed with plastic sheeting and placed under a negative pressure. The insulation removal contractor worked three 8-hour shifts per day for these 15 days and completed all work as scheduled. Eighty large dumpsters of material was removed. During this work, we maintained field engineers at the site around the clock to ensure the work remained on schedule and was completed in accordance with applicable safety regulations.

During these 15 days, the Boiler Room of the unit was closed off to all other personnel.' As a result; other contractors, such as the boiler and piping contractors, could not begin work until November 11, 1985.

The outage went well. Jobs initially considered crucial and close to impossible, such as the boiler skin casing, went very well. All contractors, with the exception of the turbine contractor, were originally scheduled for one or two 8-hour shifts. The turbine work was done on two 10-hour shifts. It was only during the last week of the outage that limited overtime became necessary.

Three occurrences took place during the outage which had great potential for upsetting the schedule. Each occurrence was dealt with accordingly and adjustments made to compensate. As a result, the scheduled completion date remained unaffected. These occurrences are described below.

1. As mentioned earlier, the stator rewind was found to be in need of rewinding. Coils were manufactured, installed and tested within 8 weeks of award.

2. The main steam and hot reheat lines were found to be severely exfoliated. Within 10 days of a decision to acid clean this piping, the cleaning system connections were fabricated and installed, the cleaning completed, and the temporary connections were removed. Total cost of this work was slightly over $100,000. The turbine and boiler contractors were slightly delayed, however, a weekend of overtime brought them back on schedule.

3. Difficulties in electrical testing and delays in release for testing. Adjustments were made in testing responsibilities, work hours and overtime to compensate.

The Outage was completed on schedule. On January 25, 1986, at 9:37AM the generator relay was closed. On January 27, 1986, a cold spell hit the Cincinnati area and the unit was used to produce over 100 MW's (75 percent of full load) to meet the system demands.

Generator vibration at the first critical was unacceptable. After several balance attempts, the rewound field was removed and balanced at low speed on Site. Mid plane balance was required to reduce vibration. This field removal, balance, and replacement work took 1 week after the unit was finally removed from service.

COMPANY LABOR EFFORT

CG&E labor efforts were monitored throughout the entire project from study thru the full implementation of life extension recommendations. All but one Of the jobs in this project were engineered by in-house engineering personnel. All field engineering, drafting, and electrical testing was completed by our company personnel. A summary of the hours is shown in Table II below:

Table II

Summary of Company Labor WCB–3 Life Extension

Description	Manhours
Engineering (study only)	5,900
Engineering of Modifications (incl. field eng'rg.).	13,800
Drafting	8,200
Scheduling	1,100

Table II—Continued

Summary of Company Labor WCB–3 Life Extension

Description	Manhours
Electrical Testing	8,400
Plant Support	1,600
Total	39,000

Figure 4 compares monthly manpower requirements to major events in the schedule.

CONCLUSION

Our work is complete on Unit 3. All modifications required for life extension have been implemented. We can walk away from the unit with reasonable assurance of its operating reliably thru the extended life period.

The outage was a great success. It was completed on time and within budget, and at a cost of less than $100/kW. We've learned from our experience and are implementing changes now for our next outage on WCB–2 in October, 1986. This will be another full implementation of life extension recommendations.

The PRENIS program will be used to schedule not only the engineering and procurement, but the actual outage work itself. Through careful planning for completion of each item prior to contractor bidding, we hope to greatly reduce our electrical testing and contractor overtime.

Work scopes are being detailed far in advance of the outage to minimize extra work. We are capitalizing on our experience to reduce our engineering and drafting efforts. Major scope changes such as the rewind of the generator stator and acid cleaning of the main steam and hot reheat line are being planned. Our field engineering personnel will be better supported with assistance to provide better cost control and cost reporting.

ACKNOWLEDGEMENTS

Presentation of this paper is not complete without acknowledgement to the hundreds of individuals who made this life extension project a success. Everyone involved; the engineers, draftsmen, craft labor, technicians, clerks and typists played an important role in the final outcome. Special recognition is given to the Outage Team, whose unselfish dedication to the project made the pieces all come together.

REFERENCES

Pulskamp, B.E., "Life Extension of W. C. Beckord Station—Units 1, 2 & 3", Electric Power Research Institute Fossil Plant Life Extension Workshop, June, 1984

Mr. HAWKINS. How about the point that the EPA has changed the rules? Well, my time is up and I don't want to bend the rules. So if we get into that in the question and answer I would be happy to respond.

Senator INHOFE. You'll have that opportunity, Mr. Hawkins, thank you.

Mr. Tyndall?

STATEMENT OF BILL TYNDALL, VICE PRESIDENT OF ENVIRONMENTAL SERVICES, CINERGY CORPORATION

Mr. TYNDALL. Good afternoon, Senators. Thank you for inviting me here today to testify before you on the EPA's proposed changes to the Clean Air Act's New Source Review Program. My name is Bill Tyndall. I am Vice President of Environmental Services for Cinergy Services, a service company for Cinergy Corporation, which is the utility that serves the Cincinnati area and home to this committee room, or temporary committee room.

Cinergy serves about 1.4 million electric customers and 478,000 gas customers in Indiana, Ohio and Kentucky. Let me talk very quickly about why the issue of New Source Review is so critical to

Cinergy and to other companies trying to provide electrical service to our customers.

Steadily increasing customer demand for electricity and a strong and increasing economy have provided a test to our nation's electric supply in many areas of the country, particularly in the Midwest. The EPA's proposed changes to the New Source Review rule must be carefully screened to make sure that they do not undercut our ability to continue to supply power reliably and safely. And let me emphasize there is no margin for error here, as most observers recognize that the Midwest faces narrow reserve margins this summer and for the next few years.

As you are aware, electricity generating units are operated under extreme conditions of temperature, pressure and wear that makes such failures particularly likely. As an automobile or other highly integrated pieces of equipment, these various parts wear at different rates with the results that parts, both large and small, must be replaced on a periodic basis in order to keep the unit running properly. If the parts are not replaced, the failure to make such repairs results in rapid and declining reliability, unit availability, and really increases in—or decreases in the safe operation of the plant.

And I brought with me one sort of show-and-tell item. This is tubing from our Zimmer power plant. There are 30 to 50 miles of tubing in a boiler. This shows a rupture from the pressure blowing out the tubing. It is this kind of repairs that you constantly have to be making. And when you see this or where you see this starting to happen, you actually go in and will repair whole areas. And, you know, to response to some of the things that Mr. Hawkins brought up, the question of whether there was over-extensive repair and replacement in the past will be something that obviously EPA has chosen to resolve in court cases. And, you know, it's not at this point probably in the committee's ability to look at that issue or to influence it, and we'll be happy to defend ourselves in court.

But going forward, we need to have a system that allows this kind of project to go forward and make the units available because we simply can't risk having them not on line and having to wait a year or longer to get them on line because of having a food fight with EPA over whether a certain repair is covered or not under the New Source Review rules.

Also, just to comment on the grandfathering issue, as has already been talked about by other witnesses, these existing power plants are subject to a host of Clean Air Act requirements. And really, as I've testified before in front of this committee and, you know, mimicking what's up there from the refiners, there's a whole other addition of requirements coming at coal-fired power. Cinergy at this point has spent about $650 million on putting on controls in the 1990's and we expect to spend $400 million more over the next few years making NOx reductions, partly in which will address some of the issues that David described in terms of health effects in the Ohio Valley.

But all of that is taking place in response to programs in Title I of the Clean Air Act, programs that are designed to reduce emissions and improve ambient air quality. To try and turn the New Source Review Rule into the place where the reductions take place

is to put too much of a burden on this program. To put it succinctly, it is not going to work that every time in the 30 to 50 miles there is a blow-out of a tube, it is not going to work to have that be the moment when plants have to be shut down for a year when difficult decisions about whether you put upwards of $250 million or more of controls on a plant versus repowering it versus closing it down are made. The system at this moment in time is not going to survive. The companies and the system at this moment in time are not going to survive a world where that's the basis on which we put our control.

There's an alternative, which is to deal with these issues directly. I think the chairman of this committee has put forward a proposal to get all the sites together to talk about the challenges facing coal-fired power, to get all the stakeholders, the States, the environmentalists, into a room and see if there isn't a way of developing a path forward that gets the reductions, that also provides certainty for the industry.

My CEO, Mr. Rogers, has been working with EEI on an internal task force, and hoping to work with the committee to try and do the same thing. And we think that's where the environmental issues should be resolved so that we can—in terms of New Source Review it should just be a program that puts controls on new sources. It shouldn't be providing mockup for all these other air quality issues.

Senator INHOFE. All right, thank you, Mr. Tyndall.

Mr. Hawkins, you were going to make some comments about changing rules. I want to give you an opportunity to do that. I have instructed Mr. Wheeler to extinguish the traffic light so we can go ahead and give ample time to each of the four of you. So why don't you go ahead and share what you were going to share with us concerning the change in the rules.

Mr. HAWKINS. Thank you, Mr. Chairman. Very briefly, the New Source Review Program as has been described involves the EPA writing regulations which appear in the Federal Register. And then from that point on it is largely a self-policing system where the applicants are responsible for determining whether their facilities and changes at their facilities may require a permit. And they are entitled to and invited to consult with the local permitting authority or with EPA.

In the early 1980's when the industry began to discuss these life extension programs that I've been talking about, industry members discussed the fact that regulatory agencies might say these projects would be subject to New Source Review. What did the industry do? Instead of going to EPA and asking for clarification, they said, let's characterize these things as ''upgrades'' and ''maintenance;'' let's characterize them as ''reliability related,'' downplay the life extension, and above all deal with it at the local level. Do not elevate it to a national level. In other words, they made a deliberate decision to try to fly under the radar screen with respect to this very important issue.

EPA has always been ready to respond to applicability requests, and a large part of this stack of documents are EPA's responses to inquiries from other industries. Other industries have asked EPA for applicability determinations. But the utility industry by and

large chose not to do so. Why? Because we think they didn't like the answer they would get.

So then what happened? Well, in 1988 the State of Wisconsin did, in fact, elevate it to a national level. It wrote a letter to EPA that said, "We've got a project in front of us involving Wisconsin Electric Power. We'd like to know whether you think it triggers New Source Review." The agency looked at that and said, "Yes, it does." What did the company do? It hired the law firm that represents all the investor-owned utilities, virtually all of them, and took EPA to court and sued EPA saying, "What you said is unlawful." In 1990 the Seventh Circuit upheld EPA's interpretation of routine maintenance. The industry had claimed that all the WEPCO work was routine maintenance. They brought in lots of data similar to the information that TVA has shared about practices in the industry. The court said EPA is right. The court said if the industry's arguments were to be accepted, an indefinite loophole would be created in the Clean Air Act contrary to Congress' intentions.

While that case was pending, EPA began an investigation of utility practices, a broad investigation. What happened in that investigation? The same industry lawyers that brought the WEPCO case went to OMB and they got OMB to kill the investigation 2 weeks after the WEPCO case came out. So that stopped EPA in its tracks for awhile. Then the industry went to Congress and tried to get an amendment in the 1991 and 1992 sessions, which was the Energy Policy Coordination Act before Senator Bennett Johnson's committee.

Congress did not enact the loopholes that the industry sought, so they went back to EPA and they tried to get the EPA to write in broadened exemptions for routine maintenance. The industry knew exactly what the game was here and they were trying to get a very expanded definition of this loophole, because they knew what they had been doing didn't fit within the regulations as they were written.

EPA did give an expanded loophole for some things in 1992, but it didn't do it with respect to routine maintenance. Then a few years passed, EPA again began another investigation in 1997. Again, the industry went back to OMB trying to get that investigation killed, but this time OMB refused to kill it and that has resulted in where we are today. And that's why I say the rules have not been changed.

Senator INHOFE. Do any of the other panel members have a brief response to what Mr. Hawkins has just stated?

Mr. TYNDALL. Just to respond to several things. There have been—I mean, there was guidance put into the 1992 rulemaking on the WEPCO rule, of the so-called WEPCO rule, that talked about what routine repair and maintenance is. And there it said that it was an activity that was undertaken by others in the industry. So there have been some marks given by EPA, and obviously companies are making decisions and they are trying to shoot for the targets that EPA has provided.

You know, I don't want to—I know David has a view of how this has rolled out. But I think the best example of how the reality of trying to get EPA clarification on this, what it really looks like, is

a company last spring asked for a clarification as to whether when they changed the turbine blade, or the turbine blades, whether that would trigger New Source Review. And they are still waiting for a response. The only thing——

Senator INHOFE. How long ago was that?

Mr. TYNDALL. That was almost a year ago. And the only thing they have gotten from EPA was what's called a 114 request, which is essentially a request of information regarding all the projects they've done in the past. Essentially what they've done is, when they requested a clarification as to whether one of their projects would trigger New Source Review it only triggered a Federal investigation. So in that world, you know, the companies are not going to be writing EPA a lot of letters seeking clarification of what they can and cannot do.

You know, again, what has happened in the past, you know, whether companies have gone over some line and whether the line was apparent or not, is right now, you know, the subject of litigation. I'm not really in a position to comment on it. But I will tell you and, you know, echo something that Mr. Bynum says. In terms of the people out there having to make decisions about what they can and cannot do at a plant, and especially in an emergency situation where a unit goes down in the summer because of one component or another failing, and when you have very little time to get it back on line when it's needed right at that time because we don't have excess power in this area, there is not a line out there that anyone understands.

Senator INHOFE. OK, let me ask you, when you were talking about the blade in the turbine, that was not a turbine change, that was a blade in an existing turbine?

Mr. TYNDALL. You know, Senator, I'm not sure whether it was all or part of a turbine.

Senator INHOFE. I think that would be helpful for us to know. I'd like the examples. Maybe some of you have other examples, in which case for the record you could submit them. Because there's no way that we can interpret and determine this without having specific examples that are obvious to those of us who are not in the business.

Let me ask each of you to respond to Mr. Seitz's approximation of about six to 9 months in terms of the—I know this will differ from industry to industry. But as far as those industries that are represented today, and of course Mr. Hawkins having been with the EPA, you might want to respond to this, too. But I'd like to ask you your assessment of an average timeframe in which these permits—the application and the receipt of the permit. Let's start with you, Mr. Slaughter.

Mr. SLAUGHTER. Yes, Mr. Chairman. Our experience has been on the order of 18 months to 2 years. And I know you are familiar with this, but this particular question has been of so much concern with regard to the Tier II gasoline sulfur rings and the fact that the permit process, the time it takes, may inhibit our ability to comply in the given time that EPA took special notice of the problem in its recently finalized rules.

So our experience has been 18 to 24 months. We have every indication that EPA is concerned with the time.

Senator INHOFE. And you probably have records on this?

Mr. SLAUGHTER. Yes.

Senator INHOFE. If you could supply those, would you do that?

Mr. SLAUGHTER. Yes.

Senator INHOFE. Mr. Moore?

Mr. MOORE. The information we have from our companies is typically—the words used are typically 18 months.

Senator INHOFE. All right, sir. Mr. Tyndall?

Mr. TYNDALL. We have one plant which was permitted in the late 1980's, early 1990's, and we're double checking but the recollection of one of the engineers who was involved in the project was that that was a two to 3-year permitting process for a new unit.

Senator INHOFE. That's one example and one permit you're talking about?

Mr. TYNDALL. Right. I mean I—having both worked on the program at EPA, monitored it in Congress, and sort of attended a lot of these New Source Review meetings, my overall impression for the industry and for the industry in general is one to 2 years and even longer in situations where issues involving—any kind of issue can slow it down considerably.

Senator INHOFE. Mr. Hawkins, any response to that or do you generally agree?

Mr. HAWKINS. Just a quick comment, Mr. Chairman, which is that most changes of facilities never see the Federal NSR permit process. Most changes of facilities either net out of review or are processed through the State, minor new source review. And it's only a very small fraction of all the permitting actions that are carried on by State and local agencies that are actually subject to a major Federal new source review.

Senator INHOFE. That's interesting. Do you think it might be that Mr. Seitz is taking those, including those in the averaging to come up with his time that he's——

Mr. HAWKINS. No. There are in the audience from the local agencies that may want to say something about it, but there are thousands of changes that are looked at by local and State permitting control authorities.

Senator INHOFE. OK, then a very similar question for each of you to respond to would be, addressing this reliability issue and its effect on foreign competition, competitiveness. Would anyone like to respond to that?

Mr. HAWKINS. I would like to respond to the electric supply reliability issue. I would submit that this argument about the impairment of the ability to respond to emergencies or worker safety is a classic red herring. Nobody has ever interpreted the rules to apply to the emergency replacement of the pieces of equipment in the electric utility sector, and I'm not aware of it happening in other sectors. None of the cases that have been brought, if you look at the complaints and notices of violation, involve these kinds of things. The agency has never indicated that it regards to these kinds of actions as not entitled to the exceptions.

As I was saying in my testimony, what we're talking about here are organized activities that were planned over a lengthy period by the companies themselves, going up to corporate management level

for approval in the capital budgets. These are not emergencies. These are substitutes for new capacity.

Senator INHOFE. Mr. Slaughter, you had mentioned 18 to 24 months. And I would ask you specifically if it takes your industry 18 to 24 months for permits before they can make equipment changes for new products, what does that do to your competitiveness? Do you have any thoughts about that?

Mr. SLAUGHTER. Well, we have had a lot of problems, Mr. Chairman. Because as you know, we've not had a new refinery sited in the United States since the early to mid-1970's. This essentially means that we have had to basically take place—take care of delivering product to consumers and taking care of any increase in demand through changes at the existing facilities, through maintenance, repair, replacement, some additional capacity. Now with the tremendous burdens of the Tier II requirements upon us, and also others to come, as you know we are going to be forced probably to go in and look for permits in an unprecedented fashion over the next few years. So we are not going to be able to make our compliance dates, particularly on Tier II, unless we have some relief on the permit process. And EPA has been trying to address that, at least in part.

Senator INHOFE. All right, sir.

Senator Voinovich?

Senator VOINOVICH. I was interested in Mr. Hawkins' testimony. I would think that from what I heard from Mr. Bynum, who is with Tennessee Valley Authority, that he is concerned that some of the things that you are talking about under the new rules would be included. That's the concern there. That's the kind of thing you're trying to share with the agency in terms of coming up with the rules to make sure that those kinds of things, indeed, are not included in that situation.

Mr. Slaughter, it's very interesting. I'd like you to tell everybody here at this hearing, you now have Tier II sulfur requirements and it's going to cost the industry this $8 billion, I think it was?

Mr. SLAUGHTER. Yes, sir.

Senator VOINOVICH. Approximately how much will that add to the cost of a gallon of gasoline in this country?

Mr. SLAUGHTER. Well, there are different estimates. The industry's estimate is four to five cents per gallon. The EPA estimate was about one-and-a-half to one-point-nine cents. We are much more comfortable with our estimate. It is a total of $8 billion. And then as you know, the agency is also about to propose a rule on diesel sulfur which will cost about half as much on diesel. And as you know, Washington and other areas have been getting their share of complaints about diesel prices as of late.

Senator VOINOVICH. I think at the time the biggest complaint I'm getting at my offices here in Ohio is that people are complaining about the high cost of gasoline. There's lots of reasons for that, but the fact of the matter is it's interesting that because of policies you haven't built a new refinery in this country in God knows how long. And the reason for it is it's not—why don't you tell us the reason why.

Mr. SLAUGHTER. Well, it's not possible to site a refinery because there are a multiplicity of regulations that would apply to it and

areas generally have problems with it. We are pretty much resigned to the probability that another refinery will not be sited in the United States. We're going to be permanently reliant upon the sites that we have now. And I might just add, as you pointed out, we have a stewardship responsibility which we're reminded of from time to time to deliver gasoline and diesel to the public. So we've got to keep the plant in order and up to date.

Senator VOINOVICH. One of the things that the public ought to pay attention to is the lack of energy or oil policy that we have in this country. We are right now at the mercy of the OPEC nations. If we got ourselves—our capacity to deliver gasoline is down to—we're more reliant today on overseas oil, I think at 65 percent. In 1973 it was about 35 or 40. And we're requiring you now to do some other things.

The interesting thing is I think what you're talking about is some of the things that you're going to have to do to the current facilities that you have, you're concerned that that will then trigger this New Source Review, which would then make it more difficult for you to do the job that we are asking, or EPA is asking you to do, and that is to get rid of the sulfur from your gasoline.

Mr. SLAUGHTER. That's right.

Senator VOINOVICH. The public has got to start putting some of this stuff together, about how it all works. And the point is you want to—you know, we haven't built—I'd like—why haven't the utilities explained why—why don't you build brand new utility plants? How come you haven't—you've tried to extend the life of those plants?

Mr. TYNDALL. Well, I think that's a very good point, because—I don't know. I mean, I've looked at the legislative history of the Clean Air Act amendment in 1970 and some of the claims that there was a specific date. There wasn't a specific date that was really used as when these plants would stop operating. But obviously what occurred was there wasn't the ability to add a whole bunch of new plants, so there was needed capacity continuation into the 1990's from the existing plants. Again, there was—I don't think it was a secret that there were projects undertaken to restore deteriorating capacity.

You know, it's certainly one of—you know, a line that EPA is now claiming it can discern that it certainly wasn't informing people of in the past as to what exactly could be done and couldn't be done. They have never provided a list of projects, they've never said a money amount that couldn't be done. They've never said if you capitalize something it can't be done. So none of the—there's never been any discussion about exactly what can and can't be done until they bring enforcement actions and cite companies. First Energy was cited for something that occurred in 1979.

So the ability to site these plants is—and to site any plants. Cinergy is trying to build a state-of-the-art gas-fired unit in a small town in Indiana, the kind of project that I think NRDC would want to see us doing, and we're having a very difficult time siting it because of issues involving land use, local air quality issues. And so in that world where it's so difficult to bring new things on line, you are going to continue to see pressure where there is very little margin for error, you are going to see continued pressure to keep these

plants running. If any of our major units have to go down for whatever reason in the summer, it puts a serious strain on the entire Ohio-Indiana—and really the whole Midwest region. And, you know, we're going to do whatever we can to avoid that.

Senator VOINOVICH. Well, your company I think did Zimmer. It was going to be a nuclear power, and they just that down and they spent——

Mr. TYNDALL. Right, which is the last plant we brought on.

Senator VOINOVICH. That last plant. And I think part of the problem—I mean, another reason I would think logically that you're trying to extend the life is you have rate payers, people that have got to pay the rates. As the Governor of this State in terms of the rates that our residents pay, in terms of the competitiveness of our industries, we have parts of the State where people complain their rates are so high they're not competitive. We're concerned about, you know, competitiveness. All this has to be tied in. It's a reasonable, rational way of trying to develop rules and regulations.

The other thing, Mr. Chairman, is the whole issue of fossil fuel. There are a lot of people in this country today that believe that there are some folks that just want to eliminate fossil fuel plants period, get rid of them. But you get rid of fossil fuel and nobody wants nuclear.

If you don't mind, Mr. Chairman, we had a big hearing in Cleveland a month ago with some folks that were very concerned that they're going to run this nuclear waste through the City of Cleveland, out to Yucca Mountain. Well, I'll be dead before Yucca Mountain ever becomes a storage facility for nuclear waste. And someone was saying, well, what's the deal? We want to kill nuclear waste. Well, where are we going to get our power? Solar.

We need to bring some rationality to all of this. And I think the environmental groups and the industry ought to get together at a table, and I'm hope that maybe in this room, like you suggested, Mr. Chairman, get everybody together and talk about this and where are we going? What is our national policy in regard to, say, the oil industry? Where are we going? Are we going to be completely relying on everyone else?

Henson, your industry—you know, 18 months to 2 years. I think one of the other things is, you're all from different regions. That's the other thing. Is there a variation in the regions in terms of issuing the permits?

Mr. Slaughter, I'm sure you have several regions.

Mr. SLAUGHTER. Lots of them.

Senator VOINOVICH. Would you comment on that?

Mr. SLAUGHTER. There is some variation, but the average is what I've given you. A lot of our permitting activity takes place in Region VI, which is Texas and Louisiana, but that's the national average.

Senator VOINOVICH. Mr. Hawkins?

Mr. HAWKINS. Senator, may I? If I can comment briefly on the question of the ability for new coal plants to get a permit and the life extension issue.

Again, the facts won't bear out the claim that new coal plants couldn't get permits under the NSR and PSD rules. East Bend, the Trimble County Plant, the Rockport Plant, these are all plants within a hundred miles or so of here along the Ohio River that all

got permitted with state-of-the-art controls under the PSD regulations.

As far as life extension, we don't object to extending the life of these facilities, provided that they modernize their pollution controls when they do. Our objection is that the companies were not up front about what they wanted to do and failed to negotiate out what the requirements would be for cleaning up their power plants when they decided to extend the life of these old units, rather than building new capacity.

So we're not objecting at all to finding ways to save money for the rate payer. I'm a rate payer, too; and my bill is as high as anybody else's and I'd like it to be lower. But you can clean these plants up economically and improve air quality and improve public health. And if that's part of your life extension program, then you're not going to have any arguments from us.

Senator VOINOVICH. So the issue is not the length of the old plants, just tearing them down and rebuilding them, your point is that if you're going to be going forward with it that you ought to try to have the most modern technology available to you when you——

Mr. HAWKINS. If you want to run them longer, clean them up. I mean, the irony is that we're embarking on new regulation and a competitive playing field. And the fact is that the grandfather status of these extended life power plants is introducing a competitive distortion against new merchant gas-fired power plants that want to come on to the market and they're having trouble getting financing because they have to compete head to head against plants with a built-in pollution subsidy because of their grandfather status.

Senator VOINOVICH. But you will admit that they have done, as one of the other witnesses said, they have reduced the pollution from these coal-fired plants.

Mr. HAWKINS. Some industries have done better than others. As I said in my prepared testimony, 20-year-old power plants are responsible for 88 percent of the power plant sulfur oxide pollution, and 84 percent with the nitrogen oxide power plant pollution. They're hanging on there with the bulk of the pollution in those 20-year and older power plants. That's not impressive performance in my view.

Mr. TYNDALL. But, I mean, Senator, there is a very legitimate issue about talking about what is the best way of—if further reductions are to be made what is the best way. I think the question where Mr. Hawkins and I may disagree is whether you use a program that essentially says, you know, when you blow—you know, as he would have it, and it's been described as a hair trigger. When you blow a tube in the 30 to 50 miles that are in a power plant, that's a second that you swoop in and shut down the plant. You put on state-of-the-art controls. That isn't going to work. That's not reality.

And Cinergy has been working constructively with lots of environmental groups, with other companies, to try and find a way of resolving these issues in a manner that makes sense for the environment, that makes sense for industry. And, you know, I mentioned before, Senator—Chairman Smith's initiative. I know there's

some discussions going on between companies and environmental groups, in other words, trying to find a solution. I don't think the solution is to have a hair trigger on New Source Review so that if you have the misfortune of having any unit, any portion of your unit, have a problem, that that's the moment you're going to swoop and have to face the 2 years, make the investment. That's not a rational way of resolving these issues.

You know, the life extension issue, again, it's in the courts. I don't think there was—some of these quote, unquote, life extension projects, I don't think there was a lot of hiding the ball. You know, I think I know of an example where there were T-shirts and mugs and it was on annual reports. So I don't think that the court is going to find some conspiracy to violate the law. But, again, that's all in the courts.

Senator VOINOVICH. That's in the courts. I think the thing is to look at the whole picture, the spectrum, and figure out where Mr. Hawkins would come out in terms of, hey, this is something that really ought to have required. And you know, I'm sure there are instances of that out there. And I think that if there are, then we should say that there are, OK; and then they're going to be brought under the net. But there is a rational, common sense way of handling this that doesn't put the industry in a place of not being able to protect workers or reliability and some of these other things.

The last question I'm going to ask is, and maybe I'm taking it away from the chairman here was, but he talked about my briefing for this issue of the actual and the potential, that today if you're going to do something you're looking at what it is actually today and then what it's going to be actually tomorrow, although the potential may be there for the new thing to increase emissions. I guess that's what it's about. But if you look at the actual experience, common sense would say that you're not, even though someone says you've got the potential of going up, that in all practicality that's not going to be the case. I don't know if we're just talking about words here. Is this a real issue?

Mr. SLAUGHTER. Senator, if I could jump in for a minute, it's a very real issue. All the major industries like ours that are regulated build in a compliance margin to our operations. In other words, we don't go all the way out to our permitted levels of emissions. So the problem is that that means that there's a built in problem with NSR, because they look at your actual emissions to your potential emissions, and your potential emissions include the compliance margin. So that is being done almost automatically to trigger NSR.

So one of the things I mentioned is that the net has been cast very widely to bring everybody into the ambit of NSR review, and the actual—the potential emissions test is one of the major reasons why.

Mr. MOORE. Senator, we also feel that this is a major problem and it's recent. Here again, since 1998, EPA is going back and changing something that had been a practice for largely 20 years of measuring actual to actual. Now the idea is you have to look at potentially the problem, that'll potentially increase. We take the position, our interpretation of the law, would be for our numbers that if you are operating at a certain level and if you make some

kind of a change to your equipment under the regulations before 1998, or the guidelines, you didn't have to go through the permitting process, because you weren't changing any of the actuals.

If you did increase your actual emissions, even within your permit level, if under the regulations it meets the term "significant," then you should go get a permit. But what we're talking about here is no realization of an increase at all and then you go through this process. This is new. This is conflicting the system. This is causing States not to know what to do. It's causing the industry not to know what to do. And for what purpose? If there is no increase in emissions, why do you have to go through this? The law says clearly an increase in emissions. Nowhere does it talk about a possibility. And if a possibility is achieved, then you've got to go back, because the law says, you change your operations and increase your emissions, you've got to go back and go through the review process.

So the law is pretty clear. But what we're getting into here is something different, something new, something, as Mr. Hawkins has said in all honesty, you're trying to get at not permitting an increase. You're trying to get into forced decreases. And I think Mr. Tyndall said that was not the intent of the statute. Congress didn't intend that. There are other ways you get at that, other laws that you get at that.

Senator VOINOVICH. Mr. Hawkins?

Mr. HAWKINS. First, it's not new. This was the subject of a 1979 lawsuit by the Chemical Manufacturers Association and I believe the forest products industry was part of that lawsuit. A settlement was entered in 1981 where the agency said it would propose alternatives to the potential to actual test. In 1989 the agency completed public comment and issued a rule saying it was going to retain this actual to potential test.

Now, that's all the legalisms, but let's talk about the common sense aspect because I think it's a more powerful argument. The common sense point is the statute says no emissions increase. EPA has always taken the position that if a company is willing to live with its forecast of what the actual emissions in the future will be, then it can get a permit. The difficulty has been that the companies want to come in and say there's not going to be any emission increase and then the agency says put it in writing, and they say, "Oh, no, I don't want to do that." They don't want to be bound by their assertions that there isn't going to be an emission increase. If they are willing to take an enforceable commitment that there will not be an emission increase, they can get their permit without the potential test at all.

Mr. TYNDALL. But to just add to the complexity, that sounds great until you realize that if you have a plant—you know, you had a low demand the year before, you only have 80 percent or in our industry you only use it about 80 percent of the time. What Mr. Hawkins is suggesting is in order to repair your tube you go in, and assuming EPA will respond to you and not launch a Federal investigation and allow you the level of emissions you had in the past, that essentially they'll let you freeze yourself at that 80 percent capacity. Therefore, you have essentially frozen that plant's output from that time forward at that level regardless of what future demand may be and regardless of whether any increase in the

future was related or not related to you repairing this tube. And that—I mean, this gets into the complexities of this program and the sort of arguments that swirled around it for the last 20 years. That's why we really need to find something that's much simpler, like addressing the environmental issues in a different manner and then saying because of—we have a NOx cap over all emissions in Ohio, which we may have very shortly, or whatever reason, we're protecting the environment and we're satisfied we're protecting the environment, then we don't need to worry about whether any individual plant—we don't have to worry as much about whether any individual plant is going to increase emissions and we can do something by just essentially stating you're not changing the emissions rate, something very simple. The engineers understand it. If you're change doesn't increase the emissions rate, you can go ahead and make them. It's a very simple approach. It's one that can be made to work with a number of safeguards, some of which are already in place, and it's the kind of thing that I think if EPA were willing to really sit down and talk to Mr. Hawkins but also talk to industry and look at this issue, it might be something that could be resolved instead of them going forward—I think partly because their enforcement office is making them, going forward and just making, you know, as I said, the hair trigger approach to this program.

Senator INHOFE. Well, I appreciate your following up on that because I was going to do that.

Mr. Hawkins, in your testimony and in previous briefings you emphasized the fact that industry changes the names of maintenance work depending on their audience. I think one of the examples you used is to switch from the term ''life extension'' to ''reliability of projects.'' You seem to equate that to an admission, I guess, of guilt. Having been in the business world, I know that you use different terms depending upon your audience. If a manager wants funding for a project, he uses a term that he knows the accountants will approve.

Now I understand that the environmental organizations do this, too. In a recent news article, and I was reading this, it's Inside EPA. They are talking about changing the name of the Environmental Defense Fund to Environmental Defense, because this has a greater appeal in their fund raising efforts out there. The article also says that your own organization was searching for a new communications director and an employee said that the NRDC was hoping to become ''the Bloomingdale's of the environmental movement.'' Does the NRDC hire or work with consultants to figure out the best words to use to raise the most money?

Mr. HAWKINS. I haven't heard that one. I think we would be better off if we were the Wal-Mart of the moment. Actually, we've been fairly stodgy as these things go. We haven't done focus groups or taken polls on our name. And I think proof of the pudding is our name—Natural Resources Defense Council. I have joked that we should have a tag line: ''We're the group you've never heard of.''

We've pretty much resisted the idea of trying to come up with, you know, turning ourselves into Exxon or American Brands or something that nobody knows what it stands for.

Senator INHOFE. Do you have any questions, Senator Voinovich?

Senator VOINOVICH. No, I haven't.

Senator INHOFE. Do any of the members of this committee have something they're just dying to say that they haven't had the opportunity to say? Mr. Moore?

Mr. MOORE. Yes, sir. I've got a lot of respect for Mr. Hawkins and his organization and worked with them while I was in government and I wish we could work with them more closely now. I can't let this routine maintenance thing go by. We have a different view of this. We aren't involved in a lot of things that he's been talking about involving the power companies, maybe things are different there.

All we know is in 1980 the rule was clear, you know, what was maintenance. And, yes, we didn't have a lot of needs for the Federal permitting process. It was fairly clear. Now we're having a new enforcement decision in 1999 saying what routine maintenance is, and that's where the impact is. Anything you do, these words mean anything. They cover frequent, conditional, comparative, inexpensive repairs to maintain existing equipment. Look at the position that puts a middle manager in and then look at the position that puts the State regulator in when he calls them on the phone and says, I'm getting ready to do something that's routine. It's maintaining existing equipment. It's not going to increase anything. Do I have to get the permit? What does he say back? He says I don't know. He says, you know, I gave you a permit 10 years ago and now retroactive they are coming back and saying they didn't do it right because it had a potential of increasing emissions.

Basically the rules have changed. The rules have gotten to where now they are even more unenforceable or more unfollowable, if that's a word, than they ever were before. And so, yes, you're not going to see—I mean, I don't know, by one measure you could see a great deal more of the permits being requested because of being forced to because now you are getting into things that up until 1999 everybody thought were not included.

Well, what's going to happen is you're just going to freeze the process. Nobody is going to do anything. In the mills you are not going to do anything, adding anything to improve the processing or even improve the environment. Sometimes you do both at the same time on the grounds that we don't want to go through this. It's a marginal project. We're not going to go through all this red tape and wait 18 months or maybe longer if this thing is getting more complex and more permits being required. And the States are saying we don't know what to tell you. As a matter of fact, the States are asking EPA to go back to a simpler, reformed rule and get away from some of the stuff they're proposing here, particularly in the routine maintenance area.

So I don't think we ought to let this area go by with some of us saying that we think that routine maintenance is a way to keep doing something or get away from something or whatever, that's not the case at all. Routine maintenance in our industry is meant to be just that. We are supposed to be doing something to keep a mill working, keep it running. If it increases emissions, we're supposed to get a permit and they were supposed to put some kind of equipment on to take that back down to below the emission levels. And that's not how this thing is working out there. This is something that's headed in the wrong direction. In other words, in how

it is being enforced and by what it's doing to those of us who are trying to follow these rules and regulations. And we ought not let that go by as some kind of a no real change or no real difference in procedures. That's just not true from the point of view of us trying to live under these things.

Senator INHOFE. Mr. Hawkins, do you want to respond?

Mr. HAWKINS. Actually, I'd like to make my final comment be one of agreement with something that Bill Tyndall and Joe Bynum said. Both of them pointed out the benefits of looking at a comprehensive approach to reducing emission from existing sources and preferably focusing on multiple pollutants. I think that has a great deal of merit. We are engaged in discussions, formal and informal, with a variety of players in the electric sector and we're committed to exploring that and seeing whether we can come to agreement.

Senator INHOFE. Thank you very much. Mr. Tyndall? All right, any final——

Mr. SLAUGHTER. I just might add one point, Mr. Chairman, which is, you know, it's been suggested that maybe there are people who haven't been doing much. I know you're aware of the Natural Petroleum Council's study that shows that basically over this last decade the refining industry spent more on basically environmental controls than the entire book value of the industry. So there is a major commitment there. I probably should also add as mentioned in my oral statement that we hope these talks with EPA on NSR go forward and the program office and Mr. Perciasepe, whom you mentioned, has generally been helpful in this regard. Unfortunately, that hasn't been the uniform position across the agency. We're hopeful that this hearing will help move things in a more positive direction.

Senator INHOFE. I appreciate that.

Senator VOINOVICH. Mr. Chairman, I just want to point out one thing to verify that. As Governor I really worked hard with communities to get us some ambient—to get into attainment. And there was one industry, BP, had a big refinery up in the Toledo area, and they put on an enormous amount of money into cleaning up that facility. And as a result of what they did, they brought the Toledo area into attainment. So there's a lot of good that's being done out there by industry, and I guess the thing is that we want to all keep working to continue to improve the quality of our air but we want to do it in a way that makes sense and doesn't require you to spend money on things you ought not to spend money on, at the same time realize that we want to get better.

Senator INHOFE. Thank you very much. Well, I thank all of our panelists. We're quitting exactly on schedule. But I appreciate you've come a long ways. We've come a long way to have this hearing. I appreciate your attendance here very much, and we are adjourned.

[Whereupon, at 4:45 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

[Additional statements submitted for the record follow:]

STATEMENT OF HON. TED STRICKLAND, U.S. REPRESENTATIVE FROM THE STATE OF OHIO

Introduction

Good morning, Mr. Chairman. Thank you for your kind welcome and for allowing me to offer testimony at today's hearing. I especially would like to thank Senator Voinovich and take this Opportunity to express the appreciation of southern Ohio for his leadership in defending the use of coal—one of Ohio's most valuable natural resources.

My name is Ted Strickland. It is my privilege to represent the people of the 6 Congressional District of Ohio in the U.S. House of Representatives. Ohio's 6th Congressional District spans all or part of 14 counties across the southern part of Ohio, from Warren County in the west to Washington County in the east. This part of the State also offers a beautiful national forest, some of the most pristine farmland in Ohio and many unique historic sites.

I appear here today because I am very concerned that new approaches to Federal environmental policies may result in an excessive and disproportionate hardship on already distressed parts of the country, like southern Ohio. The New Source Review (NSR) program directly affects southern Ohio and its neighboring States where some of my constituents travel to work. This region is home to coal-fired power plants, coal mines, manufacturing plants, a petroleum refinery and a large paper mill. After visiting this part of the country, it becomes readily apparent why we must strive for a healthy environment and why we must do so in a manner that allows for a healthy economy.

I support strong environmental protections which improve the nation's ability to be a good steward of our natural resources, and I am proud of the fact that the 6th Congressional District has attained compliance with all of the National Ambient Air Quality Standards for all of the criteria pollutants regulated under the Clean Air Act. However, I believe equally strongly that we have a responsibility to develop a reasonable balance between the specific goal of air quality improvement and other important public policy objectives. Like Vice President Al Gore, I firmly believe that both a good environment and a good economy can coexist while we continue to use one of our most abundant energy resources—coal. In fact, I would share that Ohio University, right here in southern Ohio, offers promising research on the development of a practical biologically based process to reduce emissions from fossil generation units. This type of research provides some assurance that in the long run our fuel supply will remain diversified, reliable and efficient. The technological possibilities are within reach, but only if research and regulation compliment each other.

Briefly, I will share with you some troubling statistics from my district and my concerns about the EPA's New Source Review (NSR) program. I think together this information demonstrates the need for meaningful reform of the NSR program so that we strike a better balance between the pace of desired environmental benefits and the increased productivity anticipated through economic development initiatives.

New Source Review Creates Problems For Economic Development

As Senator Voinovich knows, the 6th Congressional District of Ohio is one of the poorest in the State and the country. It has the lowest per capita income ($ 10,349) and the highest poverty rate (20.1 percent) of any Congressional District in Ohio. Unfortunately, Southern Ohioans have not experienced the economic recovery that most of the U.S. has enjoyed in 1990's. The 6th District includes Meigs and Vinton Counties, which have among the highest unemployment rates of any of Ohio's 88 counties (11.1 percent and 13.8 percent, respectively, compared to the statewide average of 4.3 percent). These statistics clearly underscore the region's enthusiasm for economic development opportunities and its fear of regulations which may hamper job creation. Without a doubt, low cost energy and high quality manufacturing labor are vital to the economic prospects of the region. A substantial number of the labor force—more than 25 percent—is employed in the manufacturing sector. And, this region provides a significant number of jobs in the utility, mining, and refinery sectors. Southern Ohio cannot withstand the loss of these jobs, and it certainly cannot afford to overlook any opportunity for job creation.

I have heard from the International Brotherhood of Electrical Workers (IBEW) who raise specific issues about the EPA's New Source Review proposed rule, and it should come as no surprise that one such concern is job loss. Under the current NSR program, decisions could be made to shut down utilities rather than venture into the confusing NSR permitting program to undertake what could be considered "routine maintenance" activities. Obviously, this would result in layoffs. At this

time, I would like to ask to include for the record, the statement of John J. Barry, International President of the IBEW.

Clean Air Act New Source Review "Reform" Rulemaking Concerns

As you know, New Source Review was first introduced as part of the 1977 Clean Air Act Amendments. The program is designed to ensure that newly constructed facilities and substantial modifications of existing facilities do not result in violation of applicable air quality standards. The New Source Review program is widely acknowledged to be very complicated and to be a potential bottleneck to many positive community development projects including, brownfields redevelopment and to manufacturing facility improvements and modernizations.

For example, the specific requirements dictated by the New Source Review Program depend on the location of the facility. If a plant is sited in a part of the country that fails to meet the National Ambient Air Quality Standard (NAAQS) for a pollutant, one set of requirements apply. If the plant is in a NAAQS attainment area, another set of rules apply. As you can imagine, some facilities may rest in a region that is considered in attainment for some criteria pollutants, but not others, complicating the requirements even further.

Let me describe some general frustrations my constituents and others have shared with me concerning the New Source Review program. I have learned that merely determining whether the program "applies" to a project depends on complicated rules and guidelines which have been subject to 20 years' of EPA interpretation. I have also heard that EPA could require a preconstruction permit under NSR for the replacement of worn equipment parts even though the replacements are only modifications and not new construction. In fact, these types of modifications are aimed at pollution reduction and efficiency increases—two worthy goals. On top of that, I understand that preconstruction permitting can take a year or longer. I do not understand why industry, whose business practices benefit the economy and comply with the Clean Air Act standards should suffer from the inconsistent and unintended application of the NSR program. It seems quite clear to me the program is broken and it is time to fix it.

With the Objective of creating a more efficient NSR program, EPA announced back in 1991 that it would "simplify and reform" the original New Source Review rules. To the agency's credit, it understands that the NSR program demands a thorough review and it has engaged stakeholders to work on a comprehensive reform package. I would hope that this effort results in a program that encourages modifications and maintenance at our facilities so that they remain reliable, competitive and safe.

Conclusion

I know the EPA claims many successes under the NSR program and I applaud the reduction or prevention of pollutant emissions. The environmental protections afforded under the NSR program should not be minimized here today. However, the EPA's most recent proposed changes to the NSR led to considerable controversy and the agency acknowledges the need to build in more flexibility in the program and streamline the permitting process. I would suggest that a truly meaningful reform of the NSR program could actually lead to even greater environmental benefits in the future. If the NSR program remains in its current broken state, I suspect certain facility maintenance functions may be delayed, thereby stifling progress on the air quality front.

This past fall, I raised the concern that the EPA should not shortchange the discussion on meaningful NSR reform. I am pleased to hear that a full review of approaches to NSR reform is ongoing. Without sufficient dialog among the interested parties, I have little confidence that a workable solution can be reached. Therefore, I would like to state very clearly that congressional oversight of this process does not stop here in Cincinnati. Instead, I think today's hearing demonstrates that both Senators and Representatives will continue to monitor the progress made to reform the New Source Review Program. With hard work and cooperation, I believe an equitable proposal can be crafted that creates an efficient NSR rule that avoids unnecessary pitfalls and establishes a proper balance between environmental benefits and economic progress.

I commend the chairman, Senator Voinovich, and the subcommittee for their attention and oversight with respect to this important issue. Thank you again for the opportunity to testify here today.

STATEMENT OF JOHN SEITZ, DIRECTOR, OFFICE OF AIR QUALITY PLANNING AND STANDARDS, OFFICE OF AIR AND RADIATION, ENVIRONMENTAL PROTECTION AGENCY

Good afternoon Mr. Chairman and members of the subcommittee. Thank you for the opportunity to talk with you about the New Source Review program under the Clean Air Act. The New Source Review (or "NSR") program was enacted by Congress in 1977. It's goal is to minimize air pollution from large new and modified stationary sources. Recent figures suggest that over the life of the program, NSR has prevented more than a hundred million tons of air pollution. When companies upgrade facilities, either by building a new plant or making major modifications to an existing plant, they are required to install the best available pollution control equipment. In areas with unhealthy air, NSR assures that these sources do not impede progress toward cleaner air. In areas with clean air, especially pristine areas like national parks, the program assures that emissions from new and modified sources do not significantly degrade air quality. The program also assures citizens that any large new or modified industrial source in their neighborhoods will be as clean as practical.

Upgrading pollution controls and the industrial infrastructure simultaneously makes economic and environmental sense. In general, it is more cost-effective for sources to install pollution control equipment such as scrubbers, electrostatic precipitators, or selective catalytic converters at the same time that they make major capital improvements. Because the NSR program relies on this principle, it minimizes emissions from new sources while maximizing opportunities for additional industrial and economic growth. It's a simple concept that has been working in the NSR program for almost a quarter-century, protecting our nation's air resources, and making up a critical component of our total air quality program.

Background

The NSR provisions of the Clean Air Act combine air quality planning, air pollution technology requirements, and stakeholder participation. NSR is a preconstruction permitting program. If new construction or making a major modification will increase emissions by an amount large enough to trigger NSR requirements, then the source must obtain a permit before it can begin construction. States are key partners in the program. Under the Act, States have the primary responsibility for issuing permits, and they can customize their NSR programs within the limits of EPA regulations. EPA's role is to approve State programs, to review, comment on, and take any other necessary actions on draft permits, and to assure consistency with EPA's rules, the State's implementation plan, and the Clean Air Act. (EPA also issues permits where there is no approved NSR program, such as on some Tribal lands). Citizens also play a role in the permitting decision, and must be afforded an opportunity to comment on each construction permit before it is issued.

The NSR permit program for major sources has two different components—one for areas where the air is dirty or unhealthy, and the other for areas where the air is cleaner. Under the Clean Air Act, geographic areas (e.g., counties or metropolitan statistical areas) are designated as "attainment" or "nonattainment" with the health-based National Ambient Air Quality Standards (NEARS)—the air quality standards which are set to protect human health. Permits for sources located in attainment (or unclassifiable) areas are called Prevention of Significant Deterioration (PSD) permits and those for sources located in nonattainment areas are called nonattainment NSR permits.

A major difference in the two programs is that the control technology requirement is more stringent in nonattainment areas and is called the Lowest Achievable Emission Rate (LAER). On the other hand, in attainment areas, a source must apply Best Available Control Technology (BACT) and the statute allows consideration of cost in weighing BACT options.

Also, in keeping with the goal of progress toward attaining the national air quality standards, sources in nonattainment areas must always provide or purchase "offsets"—decreases in emissions which compensate for the increases from the new source or modification. In attainment areas, PSD sources typically do not need to obtain offsets. However, PSD does require an air quality modeling analysis of the impact of the construction project, and if the analysis finds that the project contributes to ambient air pollution that exceeds allowable levels, this impact must be mitigated. Sometimes these mitigation measures can include offsets in PSD areas. In addition to ensuring compliance with the NAAQS, States track and control emissions of air pollution by calculating the maximum increase in concentration allowed to occur above an established background level—that change in concentration is known as a PSD increment.

Another key requirement is the provision in the PSD program to protect pristine areas like national parks or wilderness areas (referred to as Class I areas). If a source constructs or modifies in a way that could affect a Class I area, the law affords a Federal land manager (for example, a National Park Service superintendent) an opportunity to review the permit and the air quality analysis to assure that relevant factors associated with the protection of national parks and wilderness areas are taken into consideration, and, if necessary, that harmful effects are mitigated.

(The Clean Air Act also requires States to regulate construction for smaller changes, and at sources that are not big enough to be classified as "major." This program is known as minor NSR. However, minor NSR is not part of the NSR Reform rule and is not the focus of today's remarks)

Current Status of the NSR Program

Let me give you a few statistics about the NSR program to put things in perspective. Preliminary estimates based on our most recent data indicate that approximately 250 facilities apply for a PSD or nonattainment NSR permit annually. That's out of the approximately 20,000 sources that would be classified as "major" under the Act, and the far larger number of additional stationary sources of air pollution in the United States that are not large enough to be called major. The nonattainment NSR and PSD programs are designed to focus on changes to facilities that have a major impact on air quality. And the NSR program is resulting in cleaner air. Recent data show that, each year, NSR permits at PSD sources have prevented about half a million tons per year of new emissions compared to what would be emitted if there were no Federal or State permitting. Clearly, in the absence of NSR, Americans would be breathing less healthy air. Even in areas with clean air, there would likely have been significant declines in air quality in some places, as well as harmful impacts in national parks. As these reductions have been occurring, the United States is in the midst of a record-breaking economic expansion. Thus, the program is accomplishing its intended purpose.

In addition to the emissions reductions, the NSR program has sparked improvements and innovations in pollution control technology. Whenever demand for good control technology exists, vendors compete to supply better control technology at lower cost. This competition reduces the cost of controls as the control technology improves. This technology-forcing aspect of the program is an important reason why it has been so successful in allowing for continued economic growth while ensuring environmental protection. It also ensures that the U.S. will remain a leading exporter of pollution control technology.

NSR Reform

Despite the successes of the NSR program, some of those with a stake in the program—EPA, regulated industry, State and local governments, environmental groups, Federal land managers, and others—have engaged in a long-running dialog about how to make the program work more efficiently and effectively. The issues raised fall into five general categories. First, some argue that the process for determining exactly whether a permit is necessary for changes they are making to existing sources could be easier. Second, despite the statutory requirement that PSD permits be issued within 12 months of a complete permit application, some believe that the process for obtaining a permit can take too long, delaying construction. Third, some are concerned that the decisions made in the NSR process, such as the selection of a control technology, have been arbitrary, making it difficult to plan ahead. Fourth, stakeholders such as citizens and Federal land managers want to be more involved in the decisionmaking process. In addition, some believe that the program needs to cover more sources and is not sufficiently rigorous, while others feel that the existing program is already too rigorous and too broad in scope.

For the past several years, the EPA has been undertaking a thorough multi-stakeholder process to understand and address the concerns associated with NSR in an effort to make the program work better. The NSR program protects the public from air pollution from large sources—from every type of industry. EPA has been diligent about being inclusive and comprehensive in our analysis of industry concerns. Since 1992, we have held hundreds of hours of meetings actively seeking comments and recommendations from various stakeholders. We formed the NSR Reform Subcommittee of the Clean Air Act Advisory Committee, a group of experts from industry, environmental groups, and State and local government brought together for the purpose of making recommendations on improving NSR. We listened to analysis and debate from a wide variety of often conflicting points of view. We issued a proposed rule in 1996, took written comments, and held a public hearing. Since then, we continue to meet with stakeholders, and, as recently as this month, have had multiple meetings with outside groups representing industry.

Our fundamental principle during this reform effort has been to promote more certainty and flexibility in the permitting process while maintaining at least the same level of environmental protection as the current program. A few examples of the approaches we have proposed include: (1) promotion of flexible plantwide caps that would enable sources to make changes at their plants without triggering NSR applicability so long as the overall cap is not exceeded; (2) a more clearly defined and faster process for making control technology decisions; (3) deregulation of source modifications that have already recently installed good controls; (4) increased incentives for new or modified sources to incorporate pollution prevention or innovative control technology; and (5) opportunities for more meaningful participation in the permitting process for the public and Federal land managers through increased availability of information and earlier involvement.

We are also considering other ways to better achieve the same goals as the current program. For example, we recently held a meeting of NSR stakeholders to obtain views on the concept of a sector-based approach to NSR at utilities. This approach would tailor NSR regulations specifically to the utility sector in an effort to address issues unique to utilities, while still providing the overall environmental protection of the NSR program. As noted, we continue to discuss several issues with stakeholders, and have not reached final decisions on the Reform package. However, we hope to complete an NSR Reform rulemaking later this year.

Mr. Chairman, this concludes my prepared statement. I appreciate the opportunity to be here today. I would be happy to answer any questions that you may have.

STATEMENT OF JOE BYNUM, EXECUTIVE VICE PRESIDENT, FOSSIL POWER GROUP
TENNESSEE VALLEY AUTHORITY

Mr. Chairman, thank you for the opportunity to testify before the subcommittee today. In my testimony today, I am providing the committee with the views that are solely those of the Tennessee Valley Authority. I appreciate your interest in the Environmental Protection Agency's proposed changes to the New Source Review (NSR) program. Depending upon how EPA changes this program, there could be a lasting impact on the operation of individual fossil plants and, in fact, the reliability of our nation's electric system.

The Tennessee Valley Authority is a Federal agency and corporation charged with fostering the economic and social well being of the residents of the Tennessee Valley. This includes managing the Tennessee River system, with responsibilities for flood control, navigation and stewardship of land and water resources. As part of this mandate, TVA operates the nation's largest integrated public power system, providing electricity to eight million residents in a seven-State region.

In total, we have over 28,000 megawatts of generating capacity. Coal-fired generation comprises about 60 percent of this capacity, with 59 units at 11 plants in three southeastern States. This places us among the largest coal-using utilities in the country. TVA has been operating various kinds of generating technologies for more than 65 years and has substantial expertise in the maintenance of fossil plants. I am here today to represent TVA's dual responsibilities as a power producer and an environmental steward.

Although there has been some criticism of its complexity, TVA believes the NSR program has generally been a success. EPA has largely applied the program's requirements in a way that does not impede routine maintenance of the nation's electric-utility generating resources. Moreover, in the past the program has not been applied in a way to discourage improvements in unit efficiency and reliability. TVA believes such improvements—long a part of routine maintenance—are desirable to ensure a reliable supply of electricity and are in the public interest.

As the person responsible for the operation and maintenance of 59 coal units, I urge great caution as EPA contemplates changes to the program that could preclude improvements in efficiency and reliability. Unfortunately, some of the ideas being presented to EPA by others as part of the rulemaking process could discourage such desirable improvements and have a detrimental impact on the electric-utility industry's ability to safely and effectively operate our plants.

EPA's stated goal in its proposed regulation is to ''reduce the costs and regulatory burdens for applicants'' to the program. However, I would counter that, rather than achieving this admirable goal, these potential changes to the proposed rule will actually impede the NSR process. In fact, several aspects of the proposal are not only unsound on policy grounds, but appear counter to the intent of the Clean Air Act.

The current NSR regulations have long excluded routine maintenance, repair, and replacement projects at existing sources. Industries of all kinds, including the elec-

tric utility industry, have relied upon this exclusion to maintain production capabilities and capacity. Historically, EPA has employed a common-sense understanding of the term that encompassed those maintenance activities that are customary in the industry to optimize reliability, safety, availability and efficiency.

It would be a serious mistake in this rulemaking for EPA to change its historic interpretation of the definition of routine maintenance. EPA should not make changes to the program that discourage utilities from making improvements that increase plant efficiency and improve reliability.

Utilities in the Eastern Interconnect have been straining to meet demand and keep the lights on the last two summers. Now more than ever, utility maintenance programs are key to meeting demand and reliably serving the public. TVA has recently released a technical report on routine maintenance on the TVA system and in the utility industry. This report demonstrates how important maintenance is to reliable service. I would like to submit a copy of this report for the record.

Mr. Chairman, TVA finds itself in the position of agreeing with what appears to be EPA's broader goals in these NSR changes—improving the nation's air quality. However, we remain concerned that the agency may be tempted to shoehorn this admirable goal into a program that is primarily designed to address the permitting and control of new sources. Literally, the new source review program is about who turns a wrench, when and where. It is not intrinsically designed to handle broad shifts in air quality policy. Instead, this rule should use a straightforward approach that does not block the maintenance practices that have allowed this nation's industrial capacity to support the booming economy.

In the summer of 1998, TVA announced the voluntary installation of selective catalytic reduction controls to control nitrogen oxide emissions at 10 of our larger coal units. TVA is undertaking this effort because we believe it is necessary if air quality improvements are to continue in the Tennessee Valley region. We are committed to this effort although it will cost more than $500 million on top of the more than $2.5 billion that TVA has already spent to reduce emissions from its coal-fired plants. By 2005, TVA will have reduced its system sulfur dioxide emissions by SO percent. Moreover, by the same period, we aim to reduce our ozone season its nitrogen oxide emissions by 70–75 percent, driven in large part by our voluntary efforts.

I note this voluntary effort for two reasons. First, I think it demonstrates our commitment to environmental stewardship. Second, it represents an emissions control effort based on a comprehensive analysis of our entire system to achieve efficient air quality throughout the Tennessee Valley and adjacent areas. TVA carefully considered the air quality challenges facing our region, and we are placing SCR controls where they will do the most good.

When considering how the NSR program should be improved, an approach similar to TVA's system-wide plan for nitrogen oxide reductions can be a template. Although the utility industry has just finished substantially reducing its NOx emissions, TVA thinks more can and should be done. What is needed is a program that allows utilities to reduce emissions on a system-wide or industry-wide basis over time while still allowing units to be maintained as they have been historically. TVA stands ready to work with this subcommittee and EPA to build on the improvements already well under way.

Finally, in general, there should be greater emphasis on multi-pollutant planning, taking a look at how to improve air quality generally rather than just one pollutant at a time. Utilities need greater certainty as they plan for emissions control. Most importantly, air quality improvement efforts must have adequate mechanisms to ensure the most cost-effective air quality improvements. Unfortunately, the attempts to achieve these goals through the New Source Review program will likely fall flat. The underlying program is ill-equipped to answer these far-reaching policy considerations.

Mr. Chairman, the subcommittee's interest in the proposed changes to the New Source Review program is well timed. We are at an important juncture, trying to find a way to continue improvements in air quality without sacrificing the maintenance of individual facilities or the reliability of the overall electric system.

STATEMENT OF BOB SLAUGHTER, GENERAL COUNSEL AND DIRECTOR OF PUBLIC POLICY, AMERICAN PETROLEUM INSTITUTE, ON BEHALF OF THE NATIONAL PETROCHEMICAL AND REFINERS ASSOCIATION

I. INTRODUCTION

Good morning. My name is Bob Slaughter. I am General Counsel and Director of Public Policy for the National Petrochemical & Refiners Association (NPRA). I am

very pleased to be here this morning to address the need for reform of the "New Source Review/Prevention of Significant Deterioration" ("NSR") program under the Clean Air Act on behalf of both NPRA and the American Petroleum Institute ("API").

NPRA's membership includes virtually all U.S. refiners, as well as petrochemical manufacturers using processes similar to refineries. Our members own and/or operate almost 98 percent of U.S. refining capacity. NPRA includes not only the larger companies, but also many small and independent companies. API is a trade association that represents more than 400 member companies involved in all aspects of the petroleum industry including refining, exploration and production, transportation, and marketing industries. The NSR program significantly affects NPRA and API member companies.

II. OVERVIEW

The refining industry has dramatically reduced its direct and indirect emissions since Clean Air Act regulation began in the 1970's. Between 1980 and 1996, according to EPA's own figures, the refining industry decreased its criteria pollutant air emissions by 74 percent. Congress and EPA have required us to attain additional dramatic emissions reductions in the next few years.

We will meet these obligations. However, both our ability to meet them and our ability to efficiently make and deliver the products we refine to consumers is currently threatened by the likely prospect that EPA will claim that almost any operational change we make triggers "new source review" ("NSR") under the Clean Air Act.

Congress enacted the NSR program in the 1970's to ensure that sources that significantly increase their emissions must install technology to control that increase. You may well ask how an industry with the continuing record of dramatic emissions reductions which I have mentioned could be so affected by a program intended to control emissions increases.

The answer lies in the manner in which EPA now administers this program. EPA applies NSR to many changes that will never cause emissions increases, even to changes that will reduce emissions. Moreover, EPA's practice of defining critical elements of the program by guidance rather than through rulemaking—or not defining them at all—has created a situation where it is effectively impossible for even the most diligent refiner to determine when NSR applies and when it does not.

This state of affairs has created an urgent need for NSR reform. The policy consideration is this: EPA's reinterpretation of NSR threatens our ability to make the plant changes necessary to comply with important environmental requirements for stationary sources and fuel reformulation.

I would now like to address these points in more detail.

III. HOW THE NEW SOURCE REVIEW PROGRAM THREATENS FUTURE ENVIRONMENTAL PROGRESS

The refining industry now faces extensive new Clean Air Act regulations that will take effect in the near future. These include requirements both for control of refinery emissions, and for the reformulation of gasoline to remove sulfur and selected "air tonics". It seems certain in addition that EPA will require the reformulation of diesel fuel, and likely that Congress or EPA will consider requiring the phase-down or elimination of MTBE from gasoline.

Attached is a chart titled, "Cumulative Regulatory Impacts on Refineries: 2000–2010" reflecting these requirements in more detail.

Implementing these upcoming programs is very important to EPA's environmental agenda. The refining industry's environmental progress to date is very impressive. Between 1980 and 1996, according to EPA's own figures, the refining industry decreased its criteria pollutant air emissions by 74 percent, while refining capacity decreased by only 16 percent (see attached chart titled "U.S. Refinery Emissions Reductions"). These figures underestimate our current emissions reductions, since they do not include the impact of many regulations issued under the 1990 amendments to the Clear Air Act. Nor do they reflect the significant emissions reductions that have been obtained through the use of reformulated gasoline produced by our industry. EPA expects emission reductions achieved by future fuel reformulation and stationary source emission requirements to be even greater. EPA estimates that just one of the upcoming product reformulation regulations, the Tier IV gasoline sulfur reduction requirements, will produce emission benefits equivalent to removing 164 million cars from the road.

EPA has recognized that refiners face tremendous logistical challenges in meeting the ambitious goals and deadlines of these important new regulations. To implement

the regulations, refiners must make many infrastructure and process changes. For each change, refiners must determine whether NSR permitting and controls are required, and then obtain required permits before commencing any construction. Because it is now effectively impossible to determine when an NSR permit is required, and extremely time-consuming to obtain a permit, the current state of the NSR program directly threatens the industry's ability to meet Congress' deadlines for this suite of new regulations.

In order to meet Congress' ambitious goals and deadlines for upcoming Clean Air Act regulations, it is essential that refiners have a flexible and efficient permitting process. The current NSR program prohibits this and must be substantially reformed. Moreover, as discussed below, EPA's new interpretation of NSR applicability threatens continued environmental progress, as it penalizes refiners for making changes that decrease emissions.

IV. THE PROBLEM WITH EPA'S CURRENT APPROACH TO NSR APPLICABILITY

NSR is one of the most complicated regulatory programs ever created. EPA has recognized this and initiated the reform process to simplify and rectify the program. In this hearing, however, I want to focus on certain aspects of the program. EPA's current approach to NSR applicability makes it extremely difficult for refiners to determine when NSR permitting and controls are required and leaves refineries in enforcement jeopardy unless they consider NSR for any and all operational changes. As a result, the program is an untenable burden on State permitting authorities and refineries and threatens their ability to implement Congress' future environmental goals in a timely manner.

A. Background

Under the Clean Air Act and EPA's regulations, NSR is triggered by any "physical change or change in the method of operation" of a source that increases its emissions by a significant amount.[1] If a physical/operational change does not itself significantly increase source emissions, or if the source "nets out" the change by offsetting emissions reductions in other places, then, under the law, NSR does not apply.

If a change does cause a significant emissions increase, NSR requires the source to get a permit before beginning construction of the change, install emissions control technology on the change, and perhaps meet other requirements as well. It takes 18 months to 2 years on average to get an NSR permit.

EPA officials have recently made public statements that many changes at refineries over the past 20 years required NSR permits but that none were obtained. Since NSR is only triggered by an emissions increase, and given that the refining industry since 1980 has experienced dramatic emissions reductions, any such EPA claim of widespread NSR noncompliance would appear inconsistent with the basic intent of the Clean Air Act.

EPA has not disclosed information to support its claims of widespread refinery NSR noncompliance, and so we cannot comment on them specifically. However, EPA has reinterpreted its NSR rules in recent years so as to enable the Agency to allege that virtually any change a source might make requires NSR permitting and controls, even if emissions have not increased. In creating NSR, Congress intended that facilities that significantly increase emissions, by adding new equipment or making major changes, must install the latest pollution control equipment. NSR was never intended to impose new controls on older facilities simply because of their age and need for routine maintenance.

B. The Elements of EPA's Current Approach to NSR Applicability

1. The "Actual-to-Potential" Test

EPA uses the "actual-to-potential" test to determine whether a source has significantly increased its emissions. As explained below, the "actual-to-potential" test is bad public policy because it provides an incentive for sources to maximize their emissions, and punishes them for minimizing their emissions. The "actual-to-potential" test is also inconsistent with Congress' intent for the NSR program, because it requires a source to add controls when its emissions do not increase significantly or even when they decrease. Congress intended NSR to apply only when a source significantly increases its emissions. The "actual-to-potential" test is a result of EPA interpretation and should be altered or abandoned through the reform process.

In determining whether a "physical/operational change" at a source caused a significant emissions increase, EPA does not compare actual emissions before the change with actual emissions after the change. Instead, EPA compares actual emis-

[1] Clean Air Act §111(a)(4); 40 CFR 52.21(b)(2).

sions before the change with potential emissions—that is, the maximum amount the source could emit—after the change. According to EPA, NSR is triggered whenever the difference between "past actual" emissions and "future potential" emissions is "significant".

This "actual-to-potential" approach always overstates the emissions increase caused by a physical/operational change. There will always be a difference between "past actual" emissions and "future potential" emissions at any source that complies with its emissions limits. Sources must maintain a buffer between actual emissions and potential (permitted) emissions to avoid inadvertently exceeding the permitted limit. A source that cares about its environmental performance will go further and try to minimize its emissions at all times, and EPA should encourage this. However, EPA's "actual-to-potential" test punishes sources for doing so.

The "actual-to-potential" test penalizes efforts to maintain a compliance margin or minimize emissions and uses them to trigger NSR for changes that do not really increase emissions, or even decrease emissions. As a source lowers its actual emissions, the difference between those actual emissions and potential emissions gets greater. EPA counts that difference as an emissions increase that triggers NSR whenever that source makes a physical/operational change. Thus a source is rewarded for maximizing emissions and deterred from minimizing emissions. Additionally, under this approach, a process unit at a source can trigger NSR repeatedly even when its emissions do not increase at all or even decrease. [2]

Although the "actual-to-potential" test is inconsistent with the intent of the statute, EPA requires that sources use this method and only this method to determine whether an emissions "increase" has occurred. EPA has found it to be a convenient way to require controls on more sources, whether or not their emissions have increased significantly.

What is a "Physical Change or Change in the Method of Operation"?

As we have shown, the "actual-to-potential" test creates phantom emission increases. As a result, almost any change labeled a "physical change or change in the method of operation" of a source will trigger NSR even if in reality it will not increase emissions at all, or even decreases emissions.

The question then become, what is a "physical change or change in the method of operation". EPA's application of the term is a moving target. Small repairs and improvements are needed constantly at complex sources like refineries. Under EPA's current approach, it is impossible to determine when such a repair or improvement will be counted as an NSR-triggering "physical/operational change", and when it will not. We know that EPA is increasingly aggressive in its claims that such repairs and improvements trigger NSR. However, that change in position has never been subject to public notice and comment, as the Administrative Procedure Act requires. Some of its elements have not even been issued as guidance. In some cases, we do not even know what they are.

Let me offer two illustrations of these points, picked from many possible candidates.

- A's rules provide that "routine maintenance repair and replacement" does not trigger NSR. EPA has never defined these terms, either in rulemaking or guidance. However, recently, EPA has begun to claim in enforcement actions and informal conversations that this exclusion never applies to changes that increase the efficiency of a unit, improve its reliability, or reduce its costs. Under that approach, repairing or maintaining a 1990 unit with year 2000 components that improve its performance could trigger NSR. Such an approach is both economically and environmentally counterproductive. It destroys the "total quality improvement" programs that businesses must adopt in today's competitive markets—and that the Administration has endorsed because of their environmental benefits.
- EPA has always recognized that NSR is triggered when a single "physical change or change in the method of operation" causes an emissions increase. EPA has also always cautioned that if a source artificially splits a single project into two projects in order to avoid NSR, it will still treat that project as one. We agree. But EPA now claims that all changes at a plant should be aggregated together whenever they serve the "basic purpose" of the facility. Since changes that did not serve that "basic purpose" would not be made, this is a formula for aggregating all changes that a plant makes into one change. Once those changes have been aggregated, the

[2] EPA policy forbids sources that engage in "emissions trading" from counting their compliance margin as an "emissions credit" when it would be advantageous to the source to do so. See Draft Economic Incentive Program Guidance (September 1999) at 81, 106–107. But EPA NSR policy counts that same compliance margin toward non-compliance with NSR and uses it to trigger permit requirements.

"actual-to-potential" test makes it virtually certain NSR requirements will be triggered.

V. THE CONSEQUENCES OF EPA'S CURRENT APPROACH TO NSR

EPA's current approach to NSR applicability results in significant compliance uncertainty, overburdens State and refinery resources, and hinders future environmental progress.

1. Compliance Uncertainty

Under EPA's current approach, it has become nearly impossible for any refinery to determine which of its activities might trigger NSR and which will not; EPA's requirements are extremely unclear and a constantly moving target.

Refiners cannot rely on the current written guidance to determine when NSR is required because the existing guidance is unclear and often contradictory. It consists of over 4,000 pages of guidance documents, many of which are in draft form and contradict each other, and various EPA memoranda. Many of EPA's new positions on NSR applicability contradict the older guidance, and are not even in writing. Refiners often do not know EPA's latest position until it is incorporated into an enforcement action or initiative.

Refiners should be able to rely on State permitting authority decisions to determine when NSR is applicable, but it now appears they cannot. In most States, EPA has delegated the implementation of the NSR program to State permitting authorities. The State permitting authorities make permitting decisions for refineries, and regularly inspect refineries to ensure that State decisions are properly implemented. EPA also reviews and approves the States' programs, and periodically inspects the refineries themselves. However, compliance with State decisions does not necessarily accord with EPA's latest positions. In fact, EPA is currently conducting a widespread investigation of refineries regarding NSR permitting compliance as far back as 1980. In effect, EPA has called into question State NSR permitting decisions over the last 20 years. These decisions were not questioned during 20 years of State and EPA inspections.

2. Overburdening State Resources

Moreover, under EPA's current approach, hundreds of projects a year at a refinery might trigger NSR. No State has the resources to answer thousands of NSR permitting questions annually from all its major stationary sources, or to review its NSR permitting decisions over the past 20 years. Certainly, States have much better and more environmentally productive ways to invest their resources (e.g., expediting permitting for gasoline sulfur reduction requirements as EPA has agreed to do). State permitting may also be slowed down because States will proceed more cautiously for fear that they may be second-guessed by EPA. This may create permitting bottlenecks at the very time States need to proceed expeditiously to implement important upcoming regulations.

3. Overburdening Refineries

The end point of EPA's current position is universal NSR. However, no industrial economy could function if every change to a factory required a permit before construction could begin. This will be particularly burdensome for refineries given the operational changes necessary to comply with the blizzard of new fuel reformulation and stationary source regulations. EPA recognized that Congress did not intend universal NSR in its 1996 proposal for NSR reform, however EPA's new approach is achieving just that:

". . . section 111(a)(4) of the Act could—read literally—encompass the most mundane activities at an industrial facility (even the repair or replacement of a single leaky pipe, or an insignificant change in the way that pipe is utilized). However, the EPA has recognized that Congress did not intend to make every activity at a source subject to major new source requirements under parts C and D. As a result, the EPA has adopted several exclusions from the 'physical or operational change' component of the definition. For instance, the EPA has specifically recognized that routine maintenance, repair and replacement. . . [is not by itself] considered a physical or operational change in the method of operation within the definition of major modification." 61 Fed. Reg. 38250, 38253 (July 23, 1996).

4. Hindering Future Environmental Progress

As discussed in section III, EPA's current approach to NSR threatens the Agency's future environmental agenda by posing significant logistical challenges for implementing important upcoming regulations.

Additionally, the unnecessary costs of EPA's current approach to NSR will compete with resources needed to implement these regulations. Our resources are limited and the costs of these upcoming regulatory initiatives are high. Just one of these regulations, the Tier II/gasoline sulfur reduction requirements, is expected to nearly double the refining industry's environmental expenditures to approximately $8 billion annually. Expected requirements to reformulate diesel fuel could increase these costs by half again.

We simply do not see the logic for applying EPA regulatory reinterpretation to activities that do not increase emissions, or actually reduce emissions.

VI. REFINING INDUSTRY GOALS FOR NSR REFORM

The refining industry is encouraged by our current round of discussions with EPA on NSR reform and hope that this joint effort will continue and produce real reform. The discussions so far have been candid and useful, but we still do not know clearly what to expect from them.

We believe that any real reform must address both substantive and procedural issues. Real reform should ensure that NSR applies only if emissions actually increase significantly. The current system of perpetual exposure to NSR cannot be defended.

Real reform must alter or abandon the "actual-to-potential" test so that changes that do not increase emissions do not automatically trigger NSR. Real reform must also change EPA's current approaches to "routine maintenance, repair and replacement" and "aggregation", which work together with the "actual-to-potential" test to create exposure to NSR for virtually any change a plant makes. Perpetual NSR is unworkable, contrary to Congressional intent, and bad environmental policy.

Finally, real reform will address the need to expedite rather than hinder efforts to comply with federally mandated environmental programs.

These changes should be subject to full public review and comment.

VII. EPA'S ENFORCEMENT INITIATIVE WILL UNDERMINE NSR REFORM

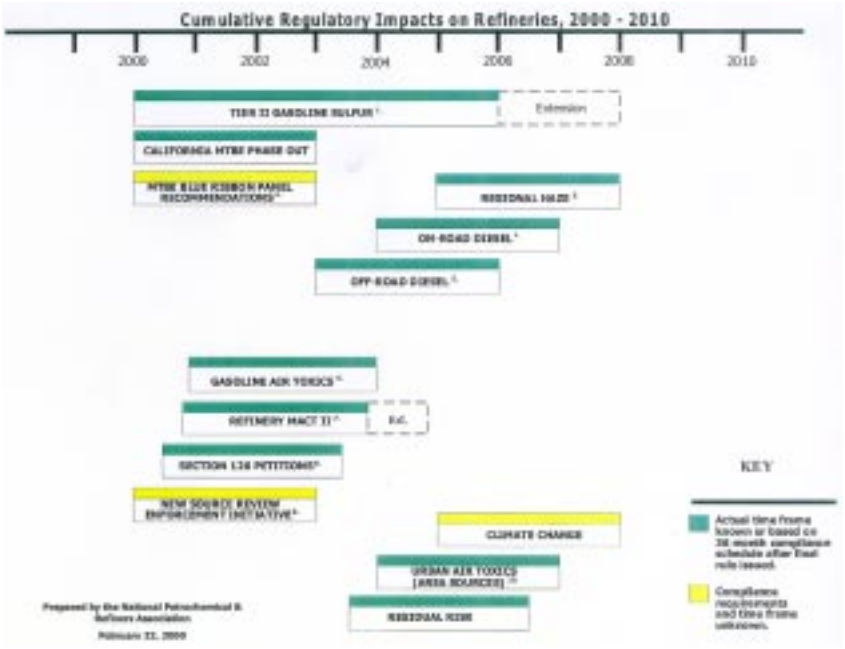
I would like to conclude with a word about enforcement.

Over the past 2 years, EPA has been conducting a massive investigation of the refining industry, and several other industries, for purported "widespread" noncompliance of the NSR program. Violations of NSR do occur, and the government should pursue them whenever they do. However, the refining industry believes EPA's allegations of widespread noncompliance are based on new and controversial reinterpretations of the NSR requirements that amount to rulemaking without notice and comment. By making fundamental changes to the NSR program through enforcement actions, EPA threatens to undermine the NSR reform process and an clarification of the program that reform can provide.

The reinterpretations that EPA wants to retroactively enforce would allow EPA to claim that virtually any source is subject to NSR. As previously discussed, this approach would be impossible to comply with, overburden State and industry resources, and undermine the implementation of future environmental regulations.

By questioning State permitting decisions and policy over the past 20 years, EPA will only further slow down the permitting process and divert State resources toward reviewing past decisions. This is inappropriate at a time when it is critical that State permitting authorities and refiners work together to expedite the permitting processes for important upcoming environmental regulations, such as the Tier II/ gasoline sulfur reductions requirements.

The decision criteria for many NSR issues are so opaque, and have changed so many times that, in our view, it is neither fair, nor just, nor sound public policy to make them the excuse for an aggressive enforcement program. The opportunity for public comment and congressional review of EPA's proposed reinterpretation of NSR is necessary to respect the due process rights of those who have to comply. If EPA wants to revise the NSR program, it should do so through the reform process.



FOOTNOTES:

1. Longer compliance time for small refineries in some mid-western and western states and small refineries covered by SBREFA.

2. Specific actions in response to recommendations and compliance dates unknown. Time frame estimated.

3. Regional haze SIPs due 2005-2007. Earliest compliance date. Schedule may be impacted by NAAQS litigation.

4. EPA has indicated implementation by 2007. NPRM expected in Spring 2000.

5. EPA has indicated implementation by 2006

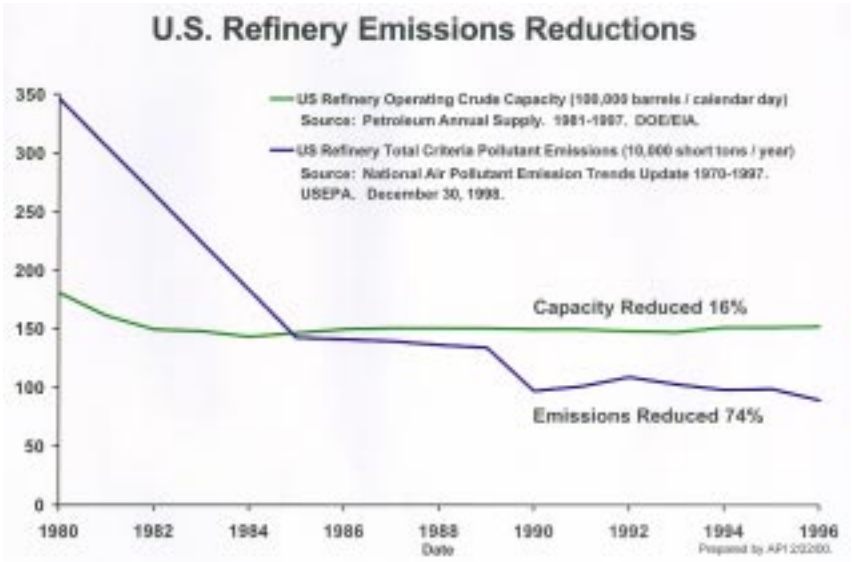
6. CAA Section 202 (l) final rule expected December 2000. Estimated compliance date 36 months later.

7. Compliance date may be harmonized with Tier II schedule.

8. Section 126 petitions (NO_X emissions) reflected because NO_X SIP call program is subject to a court-ordered stay.

9. Based on EPA statements to press. Estimated date for implementation.

10. Urban Air Toxics Strategy includes controls for gasoline distribution and oil and gas production sources. Estimated compliance schedule.



STATEMENT OF W. HENSON MOORE, AMERICAN FOREST & PAPER ASSOCIATION

Good afternoon. I am Henson Moore, President and CEO of the American Forest & Paper Association Thank you for inviting me to present the views of America's leading forest and paper companies on EPA's New Source Review Program, or NSR. This hearing exemplifies your concern to see that our environmental laws work.

AF&PA believes that the NSR program should meet a few basic principles. First, the rules should be consistent, in sync with congressional intent, and not change in midstream. Second, policies should benefit the environment. And finally, program regulators, not enforcers—should set regulatory policies in a process that is open to public scrutiny.

Based on these principles, our industry judges today's NSR program as fundamentally "broken." It needs immediate reform.

Everyone agrees it's broken EPA, the States, industry, Republicans and Democrats in Congress and notably labor unions. In fact, the Forest Products Industry National Labor Management Committee, a coalition of labor unions and industry organizations which represent over 1 million workers, issued a statement today raising similar concerns with EPA's reform and enforcement efforts. I would like to submit it into the hearing record.

Making matters worse, EPA is playing "good cop, bad cop" with targeted industries, sending out conflicting signals on how it intends to pursue NSR. While the air program continues an on-going process started in 1991 to clarify, simplify, and fix NSR, the office of enforcement is aggressively issuing notices of violation on pulp and paper facilities. Other major industries are, or may soon be, facing similar assaults. By doing this, the enforcement office is reinterpreting established NSR policies that industry has long used to comply with the law and doing so without notice, comment, or any public procedure and applying these new interpretations retroactively asking for fines in the process. In addition, EPA's judgments frequently second-guess State permitting agencies earlier decisions leading to EPA's erroneous conclusion that 80 percent of industry is in non-compliance. This is as unfounded as the underlying guidance is confusing.

In some cases, plants are deferring routine maintenance, delaying conversion to cleaner fuels or making other environmental improvements, and shelving plans to move forward with production innovations all to avoid the uncertainties and burdens imposed by the current NSR review process. If this continues, two things will happen: our industry will lose its competitive edge in a global marketplace and the environment will suffer.

Our Industry and Its Commitment

Let me tell you a little about the forest and paper industry. With more than 1.5 million workers and an annual payroll of $41 billion, we're a major contributor to the nation's overall economic health.

Importantly, every AF&PA company subscribes as a condition of membership to a set of eight environmental, health, and safety principles designed to make environmental performance an essential part of every aspect of their operations. As we have increased employment and production as an industry, we've also made important environmental strides:

- We cut our sulfur dioxide emissions by 63 percent between 1980 and 1995.
- We reduced the amount of chlorine used in bleaching by 89 percent from 1988 to 1994.
- We decreased surface water discharges by 47 percent between 1988 and 1996.
- We've reduced the total energy we consume to make a ton of paper by 21 percent.
- Our industry are recycling leaders, recovering nearly half of all the paper and paperboard Americans use each year.

We have a similarly rigorous commitment to the management of forestlands, called the Sustainable Forestry Initiative SM (SFIsm) program. Participants in this innovative program abide by a set of strict principles and objectives. A panel of 18 nationally recognized experts including leading environmentalists, academics, and foresters, as well as representatives of the U.S. Forest Service and EPA oversees our performance and critiques it as part of our annual SFIsm progress report. We are especially proud that in 1999, Renew America and the President's Council on Sustainable Development recognized SFIsm with the National Award for Sustainability.

In addition to our commitment to innovation, we're also committed to cooperation. In meeting our environmental responsibilities, we work closely with regulators, environmentalists, and leaders in the communities that host our facilities, and others.

A good example is the way we worked in concert with EPA to develop the so-called pulp and paper "Cluster Rule," the first-of-its-kind multi-media regulation governing air and water quality in our industry. In fact, we were the only industry to voluntarily accept EPA's invitation to develop the "cluster" concept. Although it requires us to invest an estimated $2.8 billion in environmental upgrades, we're satisfied that the final rule fairly balances environmental improvements and benefits with our industry's capital planning expectations.

And, of course, we've been heavily involved in EPA's effort to reform the New Source Review program from the very beginning, putting constructive ideas on the table, working with other industries and stakeholders, and being responsive to EPA's requests. Incidentally, our experiences with Assistant Administrator Bob Perciasepe and his staff have always been positive and productive. We are ready to work diligently toward a reasonable NSR program.

Why NSR Is Broken

In broad terms, NSR requires a company to get a permit before it begins construction of any new "major source" with the "potential to emit" more than 100 to 250 tons a year of any regulated pollutant under the Clean Air Act. It also requires before construction begins a permit for a physical change to an existing "major source," or any change in its "method of operation," that will cause an increase in actual source emissions of any regulated pollutant exceeding specified levels. Typically, it takes over a year and a half to get a permit, even for very small plant changes, requiring extensive air quality analysis and a commitment to install expensive state-of-the-art control technology.

In creating NSR, Congress told plant operators who would increase emissions by adding new equipment or making major changes to existing facilities to install the latest pollution control equipment. But Congress never intended NSR to impose new controls on older already permitted equipment simply because of their age and need for routine maintenance. So the problem with NSR is not congressional intent.

NSR was designed to hold the line against emissions increases, not to aggressively pursue broad emission reductions. Other sections of the Clean Air Act already have that mandated purpose. The statutory term "prevention of significant deterioration" (PSD) makes that purpose clear.

The problem with NSR has always been with the way EPA has implemented it not congressional intent. The rules are too complex. The informal guidance, memoranda and letters EPA has issued over the last 23 years more than 4,000 pages of interpretations and reinterpretations is inconsistent. It is no surprise that so much confusion abounds when most of these interpretive changes occurred at EPA behind

closed doors without the benefit of public notice and comment. In particular, in recent years, EPA has sought to change interpretations that industry, the States, and EPA itself have followed for years.

The definition of "routine maintenance" is a good example of EPA's flip-flopping policies.

In 1980, EPA provided an exclusion from NSR review for "routine maintenance" without defining the term.

In 1988, an EPA memorandum indicated the agency would weigh a variety of factors "to arrive at a common-sense finding" as to what was routine maintenance. This admittedly ambiguous interpretation left much latitude in State and EPA's case-by-case reviews.

Then, in 1999 the enforcement office substantially narrowed the exclusion, without public input, stating it "was meant to cover frequent, traditional, and comparatively inexpensive repairs to maintain existing equipment."

EPA is changing the rules 180 degrees contrary to congressional intent, and is applying those changes retroactively, using a process that lacks public involvement. For example, if a plant manager replaces worn-out bricks on the inside of a furnace, doesn't that sound like routine maintenance even if the replacements are costly and occur on an irregular basis. Real NSR reform needs to go back to a "common sense" definition of routine maintenance. So the first problem is to reform NSR to make it workable.

EPA has long known of the problem. As far back as 1991, it announced it would "simplify and reform" the "old" 1980 NSR program to reduce confusion over its applicability and to streamline NSR review. Several years later, the Clinton Administration cited NSR as a candidate for reform in its National Performance Review of Regulations. At a September 1996 hearing, an EPA spokesman acknowledged: "A lot of uncertainty exists in the old regulations as they have evolved since about 1980."

Major efforts by the EPA air office in 1996 and 1998 to rewrite the NSR rules did not yield successful reform, but clearly indicated EPA's desire to fix the broken program. However, the job is not completed and confusion still exists. Recently, two senior EPA staff members heavily involved in the NSR reform discussions publicly debated the "correct" interpretation of its "actual to potential" NSR policy. If EPA officials can't figure it out and agree on a single meaning, how are States and industry supposed to?

Some people familiar with NSR, again including some within EPA, have gone so far as to suggest the program is working at cross-purposes with the Clean Air Act. During a 1993 NSR Simplification Workshop, for example, Ed Lillis, the Chief of EPA's Permits Program Branch, admitted: "the rules seem to work against the purpose of why they were established."

The agency's current method for estimating emissions from a planned plant change is another good example of how NSR policy defies logic. EPA has recently changed its interpretations to require the facility to compare its pre-change actual emissions to its post-change potential emissions. This "apples to oranges" accounting scheme forces every facility to count imaginary emissions from unused capacity as an increase in emissions resulting from the modification, thus triggering NSR even when the change will cause no real increase in actual emissions, and, in many cases, will reduce actual emissions. For example, an effort to reduce emissions and comply with the "Cluster Rule" could land a facility in the 18-month NSR permit review process and end up requiring even more controls. Where's the common sense in this? To quote a letter from Pennsylvania's Department of Environmental Protection to Robert Perciasepe, "How can we expect industry to do everything they can to minimize emissions when we will be penalizing them for these actual reductions when they come in for New Source Review?"

Or consider the outcome of this real-world scenario.

In 1 year, a typical pulp and paper site may make 40,000 changes in equipment, procedures, and operations. Based on the latest round of EPA guidance and interpretations, the environmental manager at this typical site screens them all and comes up with 400 (or roughly 1 percent) that may be considered "changes" under the new guidance. Of these, the manager decides about 25 projects that would make the plant run better and cleaner might require permitting. In the past, the State regulatory agency would have considered most of those projects inconsequential, but now they are reluctant to take a position for fear they may be second-guessed by EPA's enforcement office. Because of this uncertainty, and the fact that the State lacks the resources to process that number of projects in the first place, all 25 efficiency and reliability improvements are stopped cold.

Does any of this sound like something that's good for the environment or good for business?

Misdirected Enforcement

What's even more egregious than having to deal with a confusing myriad of guidance and interpretations is being held accountable for a constantly changing standard. We cannot sit here today and talk reasonably about NSR reform without talking about the aggressive NSR enforcement initiative launched last year. Just as we couldn't have a reasonable discussion about reforming the IRS while an army of IRS auditors were launching an all-out attack on taxpayers based on the old rules.

Unfortunately, that's what's happening under the NSR program. The enforcement actions rely on new interpretations of past EPA policy and seek large retroactive fines which can exceed $20 million per facility. The enforcement office is taking the program in the exact opposite direction of where the NSR reform effort needs to go. Hundreds or thousands of minor changes at facilities would be pulled into the review system, swamping the State review process and further delaying permitting decisions all with little or no environmental benefit. This is very counterproductive. I think all Americans can agree, it is unfair to change the rules in the middle of the game and penalize people for their retroactive application.

This abrogation of the basic principles previously outlined is leading to enforcement actions like these where EPA is overturning past determinations that NSR review was unnecessary because there was no significant expected increase in emissions.

Ten years ago, a mill replaced an old power boiler with a new one that had lower potential emissions. The State, after soliciting comments from EPA, approved the mill's permit application for the new boiler without requiring an NSR review. Now, EPA says the new boiler increases mill operating capacity and potential emissions and alleges the mill failed to comply with the NSR requirements. But the law states that only actual increases in emissions require NSR review.

A pulp and paper facility installed a boiler with a Prevention of Significant Deterioration (PSD) permit many years ago. Some years later, part of the boiler was replaced with a slightly different design that did not increase the capacity but improved the efficiency, reduced overall downtime, and decreased emissions. Now, years later, EPA's enforcement office, using new interpretations of what triggers NSR review, determined that this project was a modification that required a NSR permit and issued a notice of violation. Again, only actual emission increases require NSR review.

A facility obtains a permit from a State agency, using best emissions estimates available at the time those from EPA's emissions factors data base. Data developed years later shows the original estimate was low. EPA holds that the source should have obtained a permit based on the new data. The agency also orders it to undergo a Best Available Control Technology (BACT) analysis using today's measure of best available technology. As a result, the earlier State decision is reversed. The source must install expensive controls that were not originally available and EPA imposes a large fine. This type of ratcheting of control requirements is unfair and not required by the law.

What is EPA trying to accomplish by going after actions that are within the law and in some cases even reduce emissions?

As we cite these real-world examples to illustrate how EPA would overstep its authority, we need to make one thing clear. We are not here today to talk about the details of individual enforcement actions. We do not want to impede any legitimate enforcement discussions between EPA and our member companies. The record of the American Forest & Paper Association in recent years makes it quite clear that we have little patience for those who fail to meet their environmental responsibilities. Real violations of clear environmental regulations should be enforced. Period.

Rather, we are here today to raise legitimate concerns over EPA's overall enforcement policy. We question the logic behind the timing of what appears to be a well-orchestrated enforcement campaign at the same time that the rules underlying the enforcement actions are in flux. EPA incorrectly claims that 80–90 percent of our industry is not in compliance, 80 to 90 percent! This claim comes from bizarre interpretations of NSR. For example, one EPA enforcement official recently stated, "If capital investments at major facilities have been made for the purpose of meeting market demand, diversifying product lines, increasing production efficiency, or reducing operating costs there is a high probability of PSD violations." [Betsy Wise, EPA Region 10 Enforcement Official at January 2000 meeting of the Joint Legislative Environmental Common Sense Committee in Idaho.] In other words, if a company has pursued its routine business goals, then it seems likely to have violated the PSD standards. Yes, under this convoluted logic, 100 percent of the industry is guilty guilty of providing products to meet the changing demands of the American public while doing its best to meet the intent and spirit of the Clean Air Act!

We are here today to raise concerns over a broken environmental regulation that allows one EPA office to retroactively reinterpret regulations established two decades ago. A clear NSR regulation must be developed to eliminate arbitrary enforcement that is being imposed on companies going about their normal business in full compliance with the adopted NSR rules.

To draw a sports analogy, it's like the National Basketball Association eliminating the 3-point shot and then going back to overturn any victories that were won based on 3-point shooting. Or, if we're talking about the IRS and taxes again, it's like the IRS eliminating the mortgage-interest deduction for millions of American taxpayers today and then demanding their past taxes with huge penalties for having used the deduction in prior years.

So the second problem is this out-of-control enforcement binge. EPA should suspend those enforcement actions that rely on new interpretations of older policies and do not involve emissions above permitted limits until the NSR reforms are successfully completed. Enforcement actions where emission increases exceeded permitted limits and clearly violated the law should proceed.

Summary and Conclusions

You know the axiom all too well. It's not the role of the judicial branch to legislate. Likewise, it should not be the role of the EPA's enforcement office to regulate. Compounding this issue is the matter of timing. Not only should the enforcement office not be regulating and changing the rules of the game and applying them retroactively, they shouldn't be doing so as part of an aggressive campaign while the air office is rewriting the rules.

We fully appreciate the challenge before the air office. Making sense out of these complex rules is no easy task. And we applaud the "open door policy" that the air office has shown us in working on the reform effort. We ask, however, that EPA's reform effort follow the basic principles I have identified: establish consistent rules and only apply them prospectively, give the job to the air office, not the enforcement office, and base them on the law.

We're prepared to hold up our end of the bargain by working tirelessly with EPA to make NSR reform a reality. All we ask is that EPA all of EPA hold up its end of the bargain as well.

Thank you.

STATEMENT OF DAVID G. HAWKINS, DIRECTOR, AIR AND ENERGY PROGRAMS, NATURAL RESOURCES DEFENSE COUNCIL

Mr. Chairman, members of the subcommittee, thank you for your invitation to testify on behalf of NRDC, the Natural Resources Defense Council, regarding the New Source Review (NSR) regulatory program of the Clean Air Act. NRDC is a nonprofit citizen organization dedicated to environmental protection, with more than 400,000 members nationwide. Since 1970, NRDC has followed closely the implementation of the Clean Air Act and has sought to promote actions under the law that carry out Congress' policy decisions to protect public health and the environment from harm caused by air pollution.

In this testimony I would like to touch on three topics: the role of new source requirements in the nation's air quality management program; features of the current regulatory program that need improvement; and some of the general claims surrounding efforts to enforce the Act's NSR programs against various electric utility companies.

I. The Clean Air Act's Dual-Track Air Quality Strategy

In 1970 Congress adopted a dual-track program to protect and enhance our nation's air quality. The first program calls on States to adopt comprehensive pollution control programs under State law to achieve air quality objectives set forth in National Ambient Air Quality Standards (NAAQS) adopted by EPA. This ambient program is an example of the "assimilative capacity" approach to environmental management based on the belief that the environment can assimilate a certain amount of dirt or toxins released from human activities without causing identifiable harm. This approach starts by identifying exposure levels of pollution that current research indicates may be tolerable for humans and ecosystems and then seeks to reduce emissions from pollution sources enough to meet the maximum tolerable exposure targets.

The 1970 Act's ambient management program strengthened previous efforts enacted by Congress in the 1960's and relied on States to set control rules for pollution sources at levels just tough enough to bring total pollution down to the level of the national ambient standards. Implicit in this approach is that an area's air quality

determines the amount of clean-up required of sources. Even if there are readily available means of reducing a source's pollution, a State is not required to adopt such measures if not needed to meet the NAAQS.

But Congress did not rely exclusively on the assimilative approach to air quality protection in the 1970 Act. Congress adopted another strategy designed to minimize air pollution by requiring sources to meet emission performance standards based on modern "best practices" in pollution abatement. The performance standard approach does not set required levels of control based on the air quality conditions of particular areas. Rather, the required emission reductions are determined by assessing how much polluting processes can be cleaned up, taking account of technical and economic constraints.

Congress expected that future ambient goals would likely be more ambitious than 1970's defined goals and wanted an independent program that would be effective in reducing total emissions over time. Congress' intent in the performance standard program was to use the force of new purchases and investments to incorporate advances in pollution prevention and control as a complementary strategy to the ambient management program.

Congress applied the performance standard approach to both stationary and mobile sources but with some important distinctions. In the mobile source area (cars, trucks, buses), only entirely new vehicles were subject to federally established modern performance standards. Congress was presented with analyses demonstrating that with traditional rates of "fleet turnover," most of the benefits of tighter new car standards would be experienced in less than 10 years.

In requiring performance standards for stationary sources, Congress adopted more sweeping provisions. The Act requires that both new and modified stationary sources must meet modern performance standards. As I will discuss later, Congress in 1970 also adopted a very expansive definition of "modification."

The 1970 Act's principal tool for improved pollution control for new and modified sources was the New Source Performance Standard (NSPS), a national, categorical requirement based on very good, but not the best, pollution minimizing practices. In 1977, when the Act was amended, Congress adopted the new source review (NSR) and prevention of significant deterioration (PSD) programs to strengthen efforts to minimize emissions and air quality impacts from new and modified sources. In the 1977 Amendments Congress expanded both the scope of the rigor of the requirements for improved performance from new and modified sources. Coverage would no longer be limited to the categories for which EPA had adopted NSPS requirements; rather all new and modified sources above certain pollution tonnage thresholds would be required to minimize their emissions. Second, the level of the performance requirement would not be tied to often out-of-date NSPS; rather case-by-case determinations of current best performance would be required. Third, covered sources locating in clean areas as well as dirty areas would have to pass ambient impact tests to prevent a worsening of air quality. In 1990, Congress again increased its emphasis on pollution prevention from new and modified sources, reducing the size thresholds for coverage in badly polluted areas.

In sum, Congress has repeatedly endorsed the concept of modern performance standards for new and modified pollution sources, adopting, in successive amendments, strengthened requirements intended to make the NSR programs more effective in reducing pollution.

However, these programs have for 20 years been the subject of criticism from industry representatives and from many academic economists. The economists' argument runs, "why should new sources be regulated more strictly than existing sources? After all, air quality is determined by how much pollution is released and where it is released. The air certainly cannot tell the difference between a pound of pollution from a plant built in 1965 and that from a plant built in 1995."

Critics of the Act's new source requirements argue that instead of regulating new and old sources differently, we should simply establish our desired air quality objectives and allow them to be met by the most efficient means. Under this approach, agencies first would do research to identify the adverse effects of air pollution on health and welfare; next, agencies would convert this research into environmental standards; then, the agencies would design pollution control programs to achieve the environmental standards; finally, agencies and pollution sources would implement the pollution control programs and the air would become cleaner.

This critique and prescription has a certain superficial appeal. As I have mentioned, the ambient management program has been a central program of the Clean Air Act since 1970 and it should continue. The question is whether it is prudent to rely on the ambient standards approach as the only strategy for improving and protecting air quality. In my view that would be a mistake.

The 1970 and later Clean Air Acts reflect a judgment by Congress that the ambient standards approach should be the major pollution control strategy but that it should be complemented by other independently functioning programs such as the NSR and Mobile Source Emission Standards programs. I think that this judgment was a wise one. The history of air pollution control efforts both before and after the 1970 Act reveals that the ambient standards approach, while conceptually sound, has its weak spots, which when exploited by well-organized opposition, can prevent the program from solving air quality problems in a timely fashion.

First, the Government's capacity to acquire unambiguous information about natural processes is very limited. The research is complex, expensive, and time consuming. Due to perennial shortages of money, talent, and time, most of the studies undertaken in the past and those being conducted now are less than perfect. As a result, their conclusions are easy to pick apart and dismiss as not dispositive. Moreover, the health effects we are concerned about are increasingly related to chronic exposures to low levels of combinations of pollutants. We have never conducted an adequate study to characterize the effects from these kinds of exposures and none is even planned.

The uncertainties in what we know about air pollution effects in turn lead to controversy and delay in establishing environmental standards. All of us, including this committee, have experienced this controversy in the continuing disputes about EPA's revised ozone and particulate standards.

The next step in the process—control program design—can also be affected. Different interests argue at length about how emissions in a particular location relate to air quality in that location or elsewhere. This can and has led to uncertainty, controversy and delay in designing pollution reduction programs to meet environmental standards. The continuing fights over efforts to address transported air pollution are an example of this problem.

Another weak spot in the ambient standards abatement program is that it often requires large changes in established patterns of behavior. When an air pollution control agency adopts a regulation that applies to an existing source it is trying to get firms to spend their money, time, and thought in ways they have not planned. Not surprisingly, these firms often resist, which leads to uncertainty, controversy and delay in the final step of the ambient standards approach, the actual implementation of pollution reduction measures in the real world.

This resistance to change often feeds back to the first step in the ambient standards process, setting the standards themselves. Pressure is mounted to weaken existing standards and to oppose the setting of new ones. Again, the unified fight of industrial polluters against the revision of the ozone and particulate standards highlights this problem.

These weaknesses do not call for abandoning the ambient standards approach. But they do suggest the wisdom of complementing that approach with programs that are strong where the ambient approach is weak. The Act's NSR programs meet that need. Implemented properly, these programs can assure that as new well-controlled sources replace old ones, we will make progress in reducing emissions as our economy grows. By controlling the major pollutants, the new source programs also serve as a hedge against unidentified risks associated with those pollutants. By dealing with engineering facts rather than biological facts, the new source programs usually involve more manageable factual controversies. We are relatively good at measuring the dollar costs of meeting performance standards and calculating the emission reductions such standards can provide. Finally, by focusing on new and modified sources, the new source programs can lessen the social and political costs of reducing pollution. Because they operate at the time firms are making new investments, these programs allow firms to plan pollution prevention and control into their plant operations.

All of this does not argue that the new source programs should replace the ambient program, only that they should complement that program. For the new source programs have weaknesses in areas where the ambient program performs better. The new source programs focus on the highly technical details of engineering and thus are too insulated from effective public participation. Controlling pollution only from new sources often is not the cheapest way to achieve a unit of emissions reduction. In my view, the premium we pay to accomplish reductions where the ambient program has failed to deliver them is a prudent investment, but controls on new and modified sources should not be our only program. Finally, new source programs, because they are technology based, do not guarantee a desirable level of environmental quality. We will degrade our air quality unless we improve pollution reducing methods and processes at least as fast as we grow. The new source programs do not create adequate incentives for such improvements and thus must be com-

plemented by the ambient standards and PSD programs which do recognize that clean air is a scarce resource.

In sum, the Clean Air Act's dual track approach to air quality management employs the principle of diversification to reduce risks. In an uncertain world, a prudent investor will forego putting all his money into the one stock with the apparent highest yield. Instead he will spread his risk by selecting a range of investments some which offer high risk and high yield and others which offer less risk and less yield. Similarly, the Act resembles a stable ecosystem which has a diversity of species. Such systems are much less likely to fail in the face of adversity than systems that have no diversity.

II. How Should EPA's NSR Programs be "Reformed"?

NRDC has participated over the last decade in stakeholder discussions convened by EPA to consider ways to improve the Act's NSR programs. A major reason these talks have made little progress is the lack of agreement on the purposes of these programs. There are two major purposes: to assure that new investments do not degrade air quality and to assure that when new investments are made, emissions are minimized by requiring sources to meet performance standards that reflect modern emission prevention capabilities.

While a great deal of attention has been paid to the complexity of the NSR permitting process, the larger environmental failure of the NSR program is that the program has not brought down emissions as Congress intended. Citizens, pollution control agencies, and Members of Congress are increasingly aware of the fact that grandfathered air pollution sources are more and more the central impediment to clean air progress. Contrary to the intent of Congress, investments in new production have not resulted in existing grandfathered sources being replaced by facilities that must meet modern performance standards. As a result, grandfathered sources dominate the pollution inventory throughout the United States.

The degree to which old stationary sources determine our nation's burden of air pollution is striking, especially when compared to the impact of old cars on pollution loads. For example, fossil electric powerplants built more than 20 years ago are responsible for 84 percent of total US nitrogen oxides (NOx) pollution from that sector and 88 percent of sulfur dioxide (SOx). In contrast, 20-year-old cars contribute less than 7 percent of U.S. car NOx pollution and 3 percent of that sector's VOC (volatile organic compounds) pollution.

It is obvious that the Title II new mobile source program has done quite a good job of preventing old cars from dominating today's pollution problems but the Title I new stationary source program has performed miserably on this score.

There are some obvious reasons for the NSR program's poor pollution reduction performance. First, the rules themselves contain too many loopholes that allow sources to avoid NSR even though they continue to make significant investments year after year. Second, as recent enforcement actions have alleged, there are many instances of firms escaping the requirements of the rules by misclassifying projects in an unlawful manner.

Reform of the NSR program should address its failure to produce pollution reduction from old grandfathered sources as a priority issue as well as explore ways to simplify the NSR process. A genuine reform of the program should aim to make two basic changes: the program should apply to more industrial projects than it now does and the review process should be streamlined to enable decisions to be made quickly while protecting the public's right to participate. Instead, the "reform" proposals EPA has published over the last decade have concentrated almost entirely on changes that would expand the loopholes of the current rules so that even fewer grandfathered sources would be required to clean up as they upgraded their capital equipment.

The combination of categorical exemptions and exclusions, weak rules for calculating emission increases, and broad provisions for "netting out" of review allow far too many sources to avoid the NSR program indefinitely. When illegal evasions of the rules are added to the many exemption opportunities in the rules, we get the results we see most sources never encounter the Federal NSR program and their pollution remains with us.

NRDC has filed lengthy comments with EPA on these issues over the years and I will not burden the subcommittee with a recitation of the details here. I would like to mention one area that of "netting." Netting is the jargon for a transaction that allows new projects at existing sources to escape NSR. In essence it allows the source operator to count "reductions" from grandfathered pieces of polluting equipment at the site in calculating whether a new project will result in an emission increase that would require new source review. By allowing sources to avoid the modern performance requirements of NSR, netting preserves the status quo, perpetuat-

ing excessively high levels of pollution originally emitted by poorly controlled grandfathered pollution sources.

Netting rewards sources that have managed to manipulate the current system to preserve high levels of emissions. Current netting policy allows those high emission levels to function as an asset that can be deployed to avoid NSR/PSD review. Thus, netting operates at cross purposes with sound air quality objectives. It creates incentives to keep emissions at unnecessarily high levels and perpetuates an inefficient allocation of emission "shares" by providing the greatest rewards to the most polluting sources. Netting frustrates one of the primary objectives of the NSR/PSD program, which is to link requirements for modern emission performance standards to investments, so that emissions are reduced as the economy expands. Instead, netting allows existing emission levels to be perpetuated indefinitely.

While the netting rules are complex, the fundamental problem with the approach is easy to understand. Netting allows a grandfathered pollution source to "bequeath" its excessive pollution privileges to its descendant, the new piece of equipment. Under netting, the new piece of equipment is not required to meet modern performance standards; it can emit at much higher levels by relying on the pollution entitlements transferred from old, grandfathered pieces of equipment. In this way, excessive amounts of pollution can live on long after the original sources have disappeared. Netting resembles the former hereditary peerage system in England, where membership in the House of Lords and other privileges were handed down from generation to generation. England recently acknowledged this system has no proper place in a modern democracy. We too need to eliminate the pollution peerage that is embedded in EPA's netting rules.

For nonattainment NSR, the Supreme Court in Chevron made it clear that EPA has the authority to eliminate the availability of netting altogether. One perverse effect of netting in nonattainment NSR is that new equipment is installed without meeting "lowest achievable emission rate" (LAER) performance standards. This in turn means that a greater level of emission reduction is required to offset the new equipment's emissions than if the new equipment had met LAER standards. These additional emission reductions must come from a finite pool of existing emission sources whose total pollution load must be further reduced for the area to attain the ambient standards. Thus, the effect of NSR netting is to allow existing source owners to unilaterally dedicate the cheapest and easiest emission reductions in a nonattainment area to compensate for poorly controlled new units, leaving State and local control agencies with the more difficult task of developing an attainment plan from the more expensive, politically controversial remaining emission reduction opportunities.

EPA's original defense of its 1981 change to allow netting under the nonattainment NSR program was that areas choosing such an approach would be required to develop timely attainment plans in any event so that there would be no environmental harm. It is now the year 2000 and EPA can no longer deny that the theory it presented to the Supreme Court in the early 1980's has no basis in reality. In fact, areas have not succeeded in developing timely and adequate attainment plans. State and local agencies have protested repeatedly to EPA that they cannot identify sufficient, politically feasible emission reductions to demonstrate timely attainment. EPA has responded with policies that have permitted lengthy delays in the submission of adequate plans. Given that the premise for EPA's initial adoption of NSR netting in 1981 has not been achieved, it is time for nonattainment netting to be abolished.

To restrict netting in the PSD NSR program, EPA should reform its definition of contemporaneous so that only activities which are part of the project for which the netting claim is made can qualify. Second, EPA should reduce the netting credits available for shutting down or limiting operations at existing units to reflect the obvious fact that the new emission-increasing projects will have greater longevity than the older existing units that are generating the netting credits. For example, consider a source that proposes to build a 100-ton-per-year new unit with a 35-year useful life and to net out the increase with the shutdown of a 100-ton source that has only 5 years of life remaining. The stream of emission reductions from the shutdown source ends after 5 years but the emission increases from the new source continue for an additional 30 years. There clearly is an enormous increase in the cumulative emissions from the facility over the life of the new project that is not captured if netting credits are given for the shutdown unit based only on a comparison 1 year's emissions.

III. Enforcement of NSR Requirements

The "new source review" enforcement actions filed against major electric utilities are an effort to end a flagrant abuse of the Clean Air Act "grandfather clause" provi-

sions relating to existing pollution sources. As mentioned above, Congress in the 1970 Clean Air Act did include a grandfather clause that exempted existing stationary pollution sources from the duty to meet modern emission performance standards. However, Congress did not intend to extend a permanent, blanket exemption to existing sources. Thus, Congress provided that when an existing source was "modified" it would become subject to new source requirements. Moreover, Congress defined "modification" extremely broadly, including in the term "any physical change or change in method of operation" that increases emissions. Congress adopted an expansive definition of the term to prevent sources from evading new performance standards with piecemeal changes.

EPA regulations narrow the Act's modification definition somewhat by including an exemption for "routine maintenance, repair, and replacement." It is this exemption the defendant companies claim shield their plants from NSR. However, the challenged projects cannot be called routine, as a matter of law, logic, good policy, or history. Public information documents an industry capital investment strategy, starting in the 1980's, to upgrade existing plants to run longer and harder rather than letting them retire and be replaced by new capacity. For instance, one of the challenged projects involved removing existing 700 horsepower fans (the "lungs" of a powerplant) and replacing them with new 900 horsepower fans. If this is routine replacement, then so is taking the original 350 horsepower engine out of your car and "replacing" it with a 450 horsepower engine.

In essence, the industry decided to sell more electricity by building new capacity into their existing machines rather than building entirely new units. This practice has both kept pollution at unreasonably high levels and has functioned as a barrier to entry into the market keeping many new clean, efficient units from being built.

While the industry is now labeling these projects as "routine maintenance," utility equipment vendors as well as utility witnesses in public utility commission rate cases have described these projects as going beyond maintenance and providing capacity that otherwise would have to be created by building new units. Indeed, in a recent filing with the Department of Energy, American Electric Power Co. explicitly referred to some of the challenged projects as not including "routine maintenance" activities.

Industry's claim today is that any rebuild project, regardless of scope is "routine" as long as the rebuilt plant's maximum production capacity is no greater than the plant's original maximum design capacity. This may remind you of the fabled "one-hundred-year-old" axe: it's only had two new heads and four new handles over its life.

The industry's interpretation would read the "modification" provision out of the Act, creating a permanent grandfather exemption for all the capacity that existed prior to 1970. And when the industry litigated their interpretation over a decade ago, they lost. The utility industry in the 1980's challenged a Reagan-era EPA ruling that rebuilding a deteriorated plant to "restore" original capacity could not fit within the routine maintenance exemption. In 1990, the 7th Circuit rejected industry claims that original design capacity should define the boundary for the "routine" exemption. Wisconsin Electric Power Co. v. Reilly, 893 F.2d 901. In WEPCO, the court flatly rejected industry's interpretation as one that would confer indefinite immunity from new source standards, contrary to Congress' intent.

When the WEPCO court upheld EPA, the industry prevailed on the Office of Management and Budget (OMB) to kill a broader examination of industry practices initiated by EPA. Industry also lobbied Congress following the court ruling to amend the law to create broad new exemptions for utility modification projects. When they did not get new statutory exemptions, industry lobbied the Bush Administration for regulatory exemptions. In 1992, the Bush Administration amended the NSR rules to give the utility industry a more generous formula for calculating whether an emission increase had occurred. But the rule did not change the definition of routine maintenance. After the 1992 rule had been in place for a few years, EPA again launched an investigation to determine why so few NSR applications had been filed. The industry again sought intervention by OMB, using the Paperwork Reduction Act as a pretext. While this effort delayed EPA's investigation for a time, this time OMB ultimately rejected the industry's Paperwork Act claims.

The industry complains that EPA has not published a detailed reference book listing exactly which projects are "routine maintenance" and which are not. But EPA has explained in numerous communications with utilities and other industries, that determining the correct classification of many projects is a highly fact-specific undertaking. For that reason, These letters are similar to the opinion letters that the IRS uses to answer fact-dependent tax questions.

The utility industry implies that EPA has not given them fair notice of their NSR obligations. The opposite is true. It has been EPA's practice for 30 years to issue

"applicability determination" letters to resolve questions about whether a specific project would trigger NSR. Industry officials have known from the beginning of their rebuild programs that these types of projects could trigger NSR but they did not seek determinations from EPA for any of the challenged projects.

Minutes of a 1984 industry discussion shed some light on the industry's thinking. The minutes report a consensus that companies should——

- identify their projects as "upgraded maintenance programs;"
- "downplay the life extension aspects of these projects (and extended retirement dates) by referring to them as plant restoration (reliability/availability improvement) projects;"
- deal with the air regulatory issues "at the State and local level and not elevate [them] to the status of a national environmental issue." (ie, don't ask EPA because you won't like the answer) EPRI, Proceedings: Fossil Plant Life Extension Conference and Workshop (1984) at 27–4.

As a final argument to inspire fear in the public, the industry has claimed that they now cannot make needed repairs for fear of triggering additional enforcement actions. There is no merit to this claim. EPA's NSR rules for utilities provide generous "baseline" emission formulas (the maximum polluting hour in the past 5 years and the average of the two maximum polluting years of the previous 5 years). A company that commits to not exceed these generous limits can carry out any maintenance or other project it wishes, routine or otherwise, without triggering NSR. Companies who refuse to commit to limit their pollution increases can seek applicability determinations from EPA.

In short we believe EPA and the other plaintiffs are doing the right thing by enforcing the NSR law as Congress intended. The results of that enforcement should be to achieve a major reduction in pollution from these plants and to improve all industries' attention to their NSR obligations when they modify their facilities.

Thank you for this opportunity to testify. I am happy to answer any questions you may have.

STATEMENT OF WILLIAM F. TYNDALL, VICE PRESIDENT, ENVIRONMENTAL SERVICES, AND VICE PRESIDENT FOR FEDERAL AFFAIRS, CINERGY SERVICES, INC.

Introduction

Good afternoon. Thank you for inviting me here today to testify before you on EPA's proposed changes to the Clean Air Act's new source review ("NSR") requirements.

My name is Bill Tyndall. Since August 1998, I have been Vice President of Environmental Services for Cinergy Services, Inc., and I recently was named Vice President of Federal Affairs as well. Cinergy Services is the service company for Cinergy Corp., one of the nation's leading diversified energy companies. Its operating companies, The Cincinnati Gas & Electric Company and PSI Energy, Inc., serve more than 1.4 million electric customers and 478,000 gas customers in Indiana, Ohio, and Kentucky. Cinergy is active in U.S. power and natural gas markets and maintains a 24-hour-a-day, 7-day-a-week trading operation. The company's international business unit, Cinergy Global Resources, has assets in power generation, transmission, and distribution projects in the Czech Republic, Spain, the United Kingdom, Zambia, Estonia, and the United States. Cinergy's 1999 revenues were $5.9 billion, and its total assets are $9.6 billion. Cinergy's core energy system comprises approximately 11,000 megawatts at 14 baseload stations and seven peaking stations. Its natural gas distribution system is connected to six interstate pipelines.

Before joining Cinergy, I served as minority counsel to the House Commerce Committee and advised committee Democrats on air quality issues. Before that, I spent 5 years at EPA, serving first in EPA's Office of General Counsel, where I worked on new source review and other stationary source issues, and later as a senior policy advisor in EPA's Office of Air and Radiation, the office responsible for administering the NSR program.

Today I am here on behalf of Cinergy, a company with nearly three decades of experience under EPA's regulatory treatment of NSR. Thus, I am speaking as someone who has spent nearly 10 years working with EPA's new source review program from a variety of perspectives. My testimony also is on behalf of the Edison Electric Institute, an association of investor-owner electric utilities such as Cinergy. I will be addressing what I believe to be the serious ramifications of EPA's attempt to reform the Clean Air Act's new source review program.

A series of summer heat waves and steadily rising consumer demand have forced many utilities to the limits of their generating capacity. With the industry's equip-

ment pushed to the breaking point for extended periods, the Nation as a whole faces a risk of electricity shortfalls that is higher than ever before. As these trends continue, the need to keep electric utilities running, and running reliably, is at its apex. The availability of power in America depends on the ability of utilities to continue maintaining their facilities in the manner needed to ensure safe, efficient, and reliable generation on demand. To exacerbate the situation, electric utilities, rural cooperatives, municipal electric systems, and independent power producers are all facing significant obstacles in siting and building needed additional peaking capacity.

In the midst of these potential electricity shortfalls, EPA now proposes changes to the Act's NSR program that could require existing facilities to undergo an expensive and time-consuming permitting process before they undertake any activities intended to maintain safety, availability, and reliability. A close examination of EPA's proposal shows not only that it is contrary to Congress' focus on new sources of pollution, but that it is inconsistent with how the rule has been written and applied for nearly three decades. Moreover, EPA's plan to promulgate an unworkable rule that discourages or delays needed maintenance projects is at odds with maintaining the reliability of the nation's power supply.

Background

Electric utilities occupy a unique position in the industrial world. We arguably are the ultimate example of "just-in-time delivery" of a product to our customers. Because it is not feasible to store significant amounts of power, we must generate electricity at the very instant that our customers consume it. This requires constant and careful maintenance of our generating units, which are comprised of thousands of individual components working together as an integrated system. In this interdependent environment, the failure of a single component is sufficient in many cases to cause an entire generating unit to be shut down and require repair.

Furthermore, utilities are operated under extreme conditions of temperature, pressure, and wear that make such failures particularly likely. As in an automobile, or any other highly integrated piece of equipment, these various parts wear at different rates, with the result that parts both large and small must be replaced on a periodic basis in order to keep the unit running properly. In contrast, the failure to make such repairs results in rapid and predictably declining reliability and unit availability. At present, Cinergy operates over 60 individual generating units in our three-State system, and the maintenance required to keep these facilities operating smoothly has been, and remains, a daunting task.

Note that a failure to maintain generating units properly results not only in decreased performance, but also can cause unsafe conditions for our employees, as well as our customers. The early history of steam generation was plagued by equipment failures, with many injuries to plant employees. Since that time, the American Society of Mechanical Engineers (ASME) and other industry authorities have developed detailed codes that guide utility maintenance and repair activities to ensure that generating units may be operated safely and reliably for decades. In addition, various State agencies and insurance underwriters regulate boiler operation, maintenance, and repair practices to ensure utilities maintain their equipment properly.

These generating facilities are subject to a host of Clean Air Act provisions that constrain emissions to levels that protect the public health and welfare. For electric utilities, this includes, but is not limited to, (1) compliance with SIP-based limitations designed to achieve or maintain the national ambient air quality standards ("NAAQS"); (2) restrictions on NOx and SO_2 emissions under the Act's Title IV acid rain program, including a more stringent phase two of that program which commenced on January 1, 2000; (3) restrictions on ozone, SO_2, and particulate matter under Title I of the Act; and (4) EPA's Title V operating permit program. In this manner, Congress has ensured that all industrial facilities both old and new are subject to extensive and costly pollution control requirements. In addition, State environmental programs impose additional emission limitations that apply to our plants.

In 1970, and again in 1977, Congress enacted significant amendments to the Clean Air Act targeted at new sources of pollution. Specifically, Congress amended the Act to provide that companies that construct new facilities, or make "major modifications" to existing facilities that result in significantly increased emissions, must apply an extra layer of pollution control to these units. As EPA has recognized, Congress targeted new construction and the extensive alteration of existing units because it understood that it is more feasible technically, and less disruptive economically, for companies to install new control technology at the time these events occur than it is to retrofit existing units.

Under the terms of the NSR program, new and "modified" units must satisfy "new source performance standards," and install controls that represent "best available

control technology" or "lowest achievable emission rate" requirements. Such units also must undergo review for their impact on ambient air quality either under the "prevention of significant deterioration" program (for areas where air quality is cleaner than the NAAQS require) or under the nonattainment program (for areas where one or more NAAQS is not being achieved). Thus, a "major modification" to an old plant can create a "new" source for regulatory purposes and trigger the congressional mandate for the plant to undergo a permitting process that takes 18 months or longer to complete and results in millions of dollars in control equipment costs. While Congress may have considered this a reasonable process for a "major modification," it is clear that such a process and cost cannot be imposed on routine maintenance and repair activities if the U.S. is to maintain a safe, reliable, and reasonable supply of electric generation to homes and businesses.

EPA's Historical Treatment of the Modification Rule

Given this history, the question of whether a source has undergone a "major modification" for purposes of NSR is a crucial one for older generating units. Historically, EPA has interpreted the modification rule in a manner consistent with Congress' focus on new sources of pollution and its concern about the costs of retrofits. For example, EPA guidance recognizes that Congress "did not intend to make every activity at a source subject to new source requirements" via the modification rule, and that EPA "in no way intends to discourage physical or operational changes that increase efficiency or reliability or lower operational costs, or improve other operational characteristics of the unit." 57 Fed. Reg. 32,327. Similarly, EPA has expressed concern with requirements that would "unduly hamper the ability of any company to take advantage of favorable market conditions." 45 Fed. Reg. at 52,704. For these reasons, EPA has always excluded "routine maintenance, repair and replacement," as well as increases in production rate or hours of operation within a facility's capacity, from the definition of a modification.

EPA's actual application of the modification rule to utilities also has been consistent with both congressional intent and the agency's regulatory pronouncements. Specifically, EPA has allowed utilities to make those repairs that are customarily undertaken in the industry to maintain the availability and reliability of electric generating facilities, and to thereby maximize the useful lives of these units, without any suggestion that such repairs were non-routine modifications subject to NSR. Importantly, EPA adopted this approach while armed with an extensive agency awareness of utility maintenance practices from onsite inspections, reports filed with State and Federal regulatory agencies, and countless industry articles.

There is one case where EPA has found that repair and replacement activity crossed the line between those routine projects that keep a facility operating, and a non-routine expansion of the facility subject to NSR. In a 1989 administrative decision, EPA ruled that a plant-wide reconstruction project at Wisconsin Electric's ("WEPCo") Port Washington facility was a non-routine change because it involved a "massive" and "unprecedented" replacement of major components, some of which had never been replaced before by WEPCo or other utilities. By pursuing the WEPCo project as a non-routine modification, after years of allowing less ambitious repair and replacement projects that extended unit life, EPA confirmed that the majority of utility maintenance projects to extend life qualified as routine maintenance and did not trigger the modification rule. EPA later confirmed this to Congress, leading GAO to report later in 1990 that:

According to EPA policy officials, WEPCo's life extension project is not typical of the majority of utilities' life extension projects, and concerns that the agency will apply the ruling it applied to WEPCo's project are unfounded. (emphasis supplied)

In keeping with its statements to Congress, EPA has continued to allow utilities to undertake repair and replacement projects as needed to maximize unit life in the 10 years following the WEPCo decision, without any finding that such projects triggered NSR.

EPA's Proposal to Revoke the WEPCo Rule

However, in Federal Register notices issued in July 1996 and 1998, EPA has proposed a major revision to the NSR modification rule. I refer you to 61 Fed. Reg. 38,250 and 63 Fed. Reg. 39,857. In these notices, EPA essentially proposes to revoke parts of a 1992 rule EPA issued to formalize its WEPCo decision (the so-called "WEPCo Rule"). EPA would replace this WEPCo Rule with a new interpretation of the modification standard under which nearly all activities intended to maintain or restore the reliability or efficiency of a generating unit would trigger NSR.

EPA's original modification rule is fairly straightforward, and defines a "modification" as a: (1) physical or operational change (2) that results in (3) a significant net emissions increase. The rules then provide examples of activities that do not con-

stitute a physical or operational change, including routine repair, replacement and maintenance, pollution control projects, fuel switches, and so on. See 40 C.F.R. § 52.21(b)(2), § 60.14. As I mentioned earlier, this rule historically has resulted in a regulatory program where utilities are allowed indeed encouraged—to maintain and operate their plants as they were designed to operate.

EPA now seeks to change how each of these criteria is applied to determine whether a modification has occurred. First and most important is EPA's new approach to what constitutes a "physical or operational change." As described above, EPA has always excluded traditional utility maintenance activities, whether performed singly or grouped together, from the definition of a physical or operational change under the exclusion for "routine maintenance, repair and replacement."

EPA now proposes an interpretation of the "routine maintenance, repair and replacement" exclusion under which all activities that restore deteriorated capacity and availability must be treated as "non-routine" repairs. This would mean that all utility maintenance projects would be "non-routine," since even the simplest utility maintenance project is intended to restore lost availability and reliability. This again is in direct conflict with the history discussed earlier. It also is logically inconsistent with the language of EPA's exclusion for "routine maintenance, repair and replacement." If all repairs are non-routine, there can be no such exclusion. EPA would, in effect, read this exclusion out of the NSR regulations.

Another major change is EPA's elimination of the causation requirement of the modification rule, and its removal of the so-called "demand growth" exclusion, which excludes increases in production rate and hours of operation. EPA created this latter provision based on its understanding that Congress did not in any way intend for the modification rule to punish utilities for responding to changes in demand growth within the design capabilities of their facilities. Thus, under the rule as written, a physical or operational change cannot be considered a "modification" unless the change "results in" a significant increase in emissions. In other words, the mere fact that there is an increase in net annual emissions after a particular change does not necessarily trigger NSR. If the increase was caused not by the change but by something else for example, by an increase in production rate or hours of operation, occurring in response to an increase in product demand or some similar market force—a "modification" has not occurred. In this regard, EPA stated in the preamble to the 1992 WEPCo Rule that it "declines to create a presumption that every emissions increase that follows a change in efficiency is inextricably linked to the efficiency change." 57 Fed. Reg. at 32,327.

EPA now proposes a regulatory regime under which any non-routine (or otherwise non-excluded) change that is followed by a significant increase in annual utilization of the facility would be presumed to be a modification, even if that change does not affect a facility's overall capacity to burn fuel (and hence its emission rate). According to EPA, the Agency's "experience":

> . . . . leads to the conclusion that sources generally make non-routine physical or operational changes which are substantial enough that they might trigger NSR in order to increase reliability, lower operating costs, or improve operational characteristics of the unit and do so in order that they may improve their market position. A proximate cause for making such changes may be to respond to increased demand, or to more efficiently compete for share of a market that has flat, or even decreasing, demand. [1]

"For these reasons," the Agency continues, "EPA now seriously questions whether market demand should ever be viewed as a significant factor in answering the relevant regulatory question of whether an emissions increase results from a physical or operational change at an existing source." Indeed, according to EPA, "in a market economy, all changes in utilization and, hence, emissions might be characterized as a response to market demand." Id. In this manner, EPA's proposal appears to require that any change that is followed by a significant increase in annual utilization is a "modification" and, therefore, subject to NSR.

EPA's final change is to redefine how an emissions increase is calculated. EPA claims that "[u]nder current regulations," non-routine activity at a unit must be "deemed to be of such significance that 'normal operations' are deemed not to have begun" at the facility. In other words, EPA would treat a company that undertakes a non-routine change at a unit as if the unit had never been operated before and had no emissions history. This change is significant because the NSR rules provide that, for a unit that has not begun "normal operations," post-change emissions must be calculated based on the assumption that the unit will be operated at full tilt, 24 hours a day, 365 days a year after the change. Under this test, any change will

[1] 63 Fed Reg. 39,860.

show an increase in emissions, even if the change would not truly result in any new pollution.

But the Seventh Circuit specifically rejected this view of the emissions increase test in its review of EPA's WEPCo determination. See Wisconsin Elec. Power Co. v. Reilly, 893 F.2d at 917–18. Moreover, EPA rejected this interpretation in its 1992 WEPCo Rule, explaining that the Agency is required to compare actual emissions before and after a change, unless the unit is brand new or has been entirely rebuilt by spending 50 percent of the cost of a new facility. See 57 Fed. Reg. at 32,317, 32,323.

When one considers these changes together all repairs are non-routine, all non-routine repairs are deemed to result in an emissions increase, regardless of whether they actually did so it becomes clear that EPA plans to subject the entire electric utility industry to a new level of controls not contemplated by the original NSR program.

Summary

If EPA's goal is to obtain new source levels of emission reduction from existing sources even though those sources have already reduced emissions to address the public health and welfare requirements of the Clean Air Act then let's address this directly as a policy issue. The new source review program was never meant to require such sweeping reductions from existing utilities, and is uniquely ill-suited as a vehicle for obtaining them. In particular, EPA's interpretation of NSR would require all utilities to delay repair, and possibly shut down their facilities, for 18 months or more every time there is a minor equipment failure in order to go through the NSR process. There simply isn't enough capacity in the Nation to allow for so many units to remain inactive for such extended periods, nor would consumers appreciate the jump in rates that would accompany such a change.

EPA's proposed revision to NSR is problematic for other reasons as well. EPA's proposed NSR approach would force utilities to guess on when to install new pollution controls according to the unpredictable failure of minor pieces of equipment, rather than choosing a time that minimizes outages and technical difficulties the very problem Congress sought to avoid in creating NSR. Utilities faced with the prospect of undergoing NSR every time they replace broken turbine blades or boiler tubing would be discouraged from making such changes for as long as possible, with serious ramifications for the reliability of the nation's power supply and for the safe operation of the units. Degradation in reliability is counter to the expectations of State public utility commissions, which can and have financially penalized companies for substandard performance. Finally, for many utilities, EPA's NSR proposal also would mean foregoing the adoption of new technologies that could increase the efficiency of generating units by reducing the amount of coal needed to produce power. By discouraging such opportunities, EPA would be losing a chance to obtain significant reductions in pollutants not currently regulated under the Act, in particular, greenhouse gases.

In sum, the utility industry already faces many challenges to its ability to provide safe, reliable, and affordable power to the American public. EPA's proposed changes to the NSR modification rule should not be among them. The ongoing rulemaking process needs to be conducted in a manner that will truly reform the NSR program, rather than the piecemeal approach currently being taken by the Agency. It is now time for EPA to abandon such impractical approaches to NSR in favor of straightforward negotiations with industry, and for Congress to address the important policy issues raised in the current debate. Regardless, EPA's proposed NSR rule should not proceed on its current track.

I thank you for the opportunity to present these comments, and would be happy to respond to any questions.